Fishery Data Series No. 17-14

Salmon Escapements to the Norton Sound–Port Clarence Area, 2013–2014

by

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and

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Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY DATA SERIES NO. 17-14

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ABSTRACT

Five species of Pacific salmon (*Oncorhynchus* spp.) return to the Norton Sound–Port Clarence Area. Historically, returns of salmon to river drainages in this area have supported well-established subsistence fisheries and small-scale commercial salmon fisheries forming the cornerstone of cash economies in several remote villages. The Alaska Department of Fish and Game and Norton Sound Economic Development Corporation operated 11 salmon enumeration projects within Norton Sound–Port Clarence, with assistance from the Native Village of Unalakleet, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service Office of Subsistence Management. Management decisions affecting subsistence, commercial, and sport fisheries for salmon in the Norton Sound–Port Clarence Area were based largely on escapement counts obtained from these projects. This report summarizes escapement and age, sex, and length data collected from the 11 projects operated during the 2013–2014 field seasons within Norton Sound.

Key words Chinook salmon, *Oncorhynchus tshawytscha*, age, sex, length ASL, sustainable escapement goal SEG, biological escapement goal BEG, weir, tower, resistance board weir, Glacial Lake, Unalakleet River, North River, Norton Sound–Port Clarence Area.

INTRODUCTION

Norton Sound–Port Clarence Area encompasses commercial salmon fishing districts as well as several river drainages. Historically, returns of salmon to these drainages have supported well established subsistence fisheries. Since 1961, small-scale commercial salmon fisheries have occurred in Norton Sound and form the cornerstone of cash economies in several remote villages. Most of the income generated by commercial salmon fishing is used by local residents to conduct subsistence-related activities throughout the year. Until the 1990s, subsistence and commercial salmon fisheries in the area were managed using a combination of commercial comparative catch statistics, test fishery catches, aerial surveys and escapement data from 1 counting tower project located near the village of Elim. Since the mid-1990s, the Alaska Department of Fish and Game (ADF&G) and local organizations have collaborated successfully to implement a management regime that relies more heavily on ground-based escapement data collected at enumeration projects located throughout the area.

From 2013 through 2014, ADF&G operated 4 escapement projects to enumerate salmon, including weir projects located on Nome River and Solomon River in Norton Sound Subdistrict 1 (Nome Subdistrict), and Kwiniuk River counting tower in Subdistrict 3 (Elim Subdistrict). Norton Sound Economic Development Corporation (NSEDC) operated a resistance-board weir on the Pilgrim River (Port Clarence), a weir on Eldorado River in Subdistrict 1, a counting tower on Inglutalik River in Subdistrict 4 (Norton Bay Subdistrict), and a counting tower on North River in Subdistrict 6 (Unalakleet Subdistrict). In addition to these projects, ADF&G and NSEDC worked cooperatively operating a weir on Snake River and a video weir on Glacial Creek in Subdistrict 1, a counting tower on Fish River in Subdistrict 2 (Golovnin Bay Subdistrict), and a resistance-board weir on Unalakleet River in Subdistrict 6. Other entities have also contributed funding to projects including Native Village of Unalakleet (NVU), Bureau of Land Management (BLM), and United States Fish and Wildlife Service Office of Subsistence Management (USFWS OSM). Obtaining timely and accurate stock assessment information (e.g., escapement counts and age, sex, and length (ASL) data) from these projects is used to make informed decisions about management of subsistence, commercial, and sport salmon fisheries in the Norton Sound–Port Clarence Area. This report summarizes escapement data collected from all Norton Sound–Port Clarence projects for the 2013–2014 seasons.

PROJECT BACKGROUND

Pilgrim River Weir

Pilgrim River is 1 of the 2 largest salmon producing drainages in the Port Clarence District. Salmon Lake, whose outflow begins at Pilgrim River, is an ultra-oligotrophic lake located approximately 55 km north of Nome with a surface area of 7.49 km^2 (1,851 acres), an average depth of 14.9 m, and a maximum depth of 40 m (Todd and Kyle 1997; Hamazaki et al. 2012). The northernmost sockeye salmon *Oncorhynchus nerka* run of significant size in North America is supported by Salmon Lake. Smolt size and emigration estimates, limnological data, and other historical data collected in the mid-1990s led to the decision to fertilize Salmon Lake to enhance sockeye salmon production (Todd and Kyle 1997). Salmon Lake was fertilized 1997–2001, 2004, and 2007–2012; the amount of fertilizer deposited has varied over the years and sockeye salmon smolt abundance and size data have been monitored since 1995 (Todd and Kyle 1997; Hamazaki et al. 2012). Adult sockeye salmon returning to Salmon Lake have been enumerated intermittently since 1995 on Pilgrim River. Chum *O. keta*, and pink *O. gorbuscha*, salmon also return to Pilgrim River, with other salmon species returning in small numbers. From 1995 to 1998, a fixed-picket weir was operated on the river and a counting tower was used from 2000 to 2002 (Waitman and Dunmall 2003). However, tower counts were not reliable due to flood conditions and inaccuracy in apportioning counts to species (Hamazaki et al. 2012). Additionally, late season aerial survey counts of sockeye salmon in Salmon Lake were often much higher than sockeye salmon passage estimates collected at the tower during these years. To obtain more reliable estimates of Pilgrim River salmon escapements, a resistance board weir was installed by ADF&G and Kawerak, Inc. in 2003 using funds from the Norton Sound Fishery Disaster Act of 1999. Kawerak, Inc. operated the weir from 2003 to 2007 (Dunmall 2008) and NSEDC has operated the weir since 2008. The weir and camp site were located roughly 10.5 km downstream of the Kougarok Highway Bridge (GPS coordinates 65° 06.170 N, 164° 49.450 W; Figure 1). Typically Pilgrim River weir is operated from the beginning of July until the end of August.

Glacial Lake Weir

Sinuk River is an important sockeye salmon spawning tributary that originates in the western Kigluaik Mountains and flows 66 kilometers southwest to empty into the northwestern portion of the Nome Subdistrict. Near its headwaters lies Glacial Creek, a small tributary that drains Glacial Lake, an ultra-oligotrophic lake with an estimated surface area of 4 km^2, an average depth of 5.8 m, and a maximum recorded depth of 22 m (Todd and Kyle 1997). The project to enumerate sockeye salmon began as a weir in 2000, led by BLM with assistance from ADF&G and NSEDC. Sockeye salmon are the predominant salmon species returning to Glacial Creek, with very few pink and chum salmon. The project documented the abundance, age and size structure, and run timing of sockeye salmon spawning escapement (2000–2005) and smolt outmigration (2003–2005); limnological data was also collected during this time and added to the existing limnological database (Parker 2008). Beginning in 2006, ADF&G became the sole operator of the project. In 2012, a video monitoring system was put in place to test the feasibility of an unstaffed escapement project. Glacial Creek weir was located on Glacial Creek just downstream of its outlet from Glacial Lake (GPS coordinates 64° 50.200 N, 165° 42.400 W; Figure 1). This project had a video monitoring system that allowed the project to operate from the end of June to mid-August.

Snake River Weir

Snake River flows 27 river kilometers south from the Kigluaik Mountains and drains into Norton Sound at the Port of Nome. Chum and pink salmon are the predominant salmon species returning to Snake River; other species return in small numbers. From 1995 to 2001, Kawerak, Inc. operated a counting tower and ADF&G analyzed the data and produced project summary reports (Jones and Knuepfer 2002). In 2002, the counting tower was replaced with a fixed-picket weir and from 2002 to 2007 Kawerak, Inc. funded and operated the project, conducted data analyses, and produced annual project summary reports (Dunmall 2008). In 2008, NSEDC and ADF&G took over operation of the Snake River weir and it remained a joint project through 2012. Snake River weir was located approximately 8 km upstream from the Nome small boat harbor (GPS coordinates 64° 31.180 N, 165° 28.740 W; Figure 1). The Snake River weir is typically operated from the end of June until mid-September.

Nome River Weir

Nome River flows approximately 53 river kilometers south from the Kigluaik Mountains and drains into Norton Sound approximately 5 kilometers east of Nome. Chum and pink salmon are the predominant salmon species returning to Nome River; other species return in small numbers. The enumeration project began as a counting tower in 1993 operated by ADF&G. In 1996, a fixed-picket weir replaced the counting tower and the project continued to be operated by ADF&G. Nome River weir was located approximately 5 river kilometers upriver from the Nome River bridge on Nome-Council Road (GPS coordinates 64° 29.856 N, 165° 12.980 W; Figure 1). Typically the weir is operated from late June until mid-September.

Eldorado River Weir

Eldorado River is the largest tributary of the Flambeau River; it flows 45 river kilometers south from the Kigluaik Mountains and drains into Safety Sound approximately 23 kilometers east of Nome. Chum and pink salmon return to Eldorado River; no other Pacific salmon species returns frequently or in large numbers. The enumeration project on this river began as a counting tower in 1995 as a cooperative project between Sitnasuak Native Corporation, Kawerak, Inc., and Nome Eskimo Community with data analysis and report writing conducted by ADF&G (Rob 1995). Kawerak, Inc. operated the tower project with equipment and technical assistance from ADF&G from 1996–2002 (Waitman and Dunmall 2003). In 2003, a fixed-picket weir replaced the counting tower and Kawerak, Inc. continued weir operations until 2007 (Dunmall 2008). In 2008, funding constraints prevented Kawerak, Inc. from continuing the project which ultimately led to NSEDC and ADF&G taking over operations. NSEDC took control of the project in 2009 and remained the sole operator through 2012. Eldorado River weir was located approximately 24 km upstream from the Safety Sound Bridge on the Nome-Council Highway (GPS coordinates 64° 34.410 N, 165° 56.240 W; Figure 1). The weir is installed in late June and is dismantled in early August at the end of the chum salmon run.

Solomon River Weir

The Solomon River is the easternmost river within Norton Sound Subdistrict 1. Flowing south, it enters Norton Sound approximately 56 km east of Nome and pink and chum salmon are the major salmon species in this system; other species can be present in small numbers. The enumeration project began in 2013 to address data gaps in the Subdistrict 1 chum salmon escapement goal analysis. Relationships between chum salmon escapements in the 9 rivers of

Subdistrict 1 currently used to establish river and subdistrict-wide escapement goals were based on aerial surveys and limited enumerations project data prior to 2001 (Clark 2001). The Solomon River enumeration project was intended as a 5 year project to be used to help inform escapement goal analysis within the subdistrict. Solomon River weir was located approximately 5 km up river (GPS coordinates 64° 34.667 N, 164° 24.823 W; Figure 1). The weir operates from the first week of July and through the third week of August.

Fish River Tower

The Fish River, located on the southern Seward Peninsula, flows south to empty into Golovnin Bay in Norton Sound. Fish River has consistent runs of Chinook *O. tshawytscha*, chum, pink, and coho salmon *O. kisutch*. Fish River counting tower was started in 2014 to provide an estimate of escapement to assist is managing commercial fisheries within Subdistrict 2. The Fish River counting tower was located about 24 km upstream from the village of White Mountain (GPS coordinates 64° 46.360 N, 163° 25.220 W; Figure 1). The counting tower typically operated from mid-June and until the end of August.

Kwiniuk River Tower

The Kwiniuk River flows 62 km out of the Kwiktalik Mountains and drains into Norton Sound just east of Elim, approximately 160 kilometers east of Nome. Chum, pink, and coho salmon are the predominant salmon species returning to Niukluk River; other species return in small numbers. Kwiniuk River tower has been the longest running salmon stock assessment project in the region. Since 1965, Kwiniuk River tower camp has been located approximately 6 km upstream from the mouth of the river (GPS coordinates 64° 43.236 N, 162° 01.004 W; Figure 1). Typically the tower is operated from mid-June through mid-September.

Inglutalik River Tower

In 2011, an enumeration tower project was initiated by NSEDC on the Inglutalik River to provide an index of salmon escapement to Subdistrict 4 (Norton Bay). Inglutalik River flows 153 km out of the Nulato Hills to drain in Norton Bay. The counting tower and associated field camp were located on BLM land approximately 29 river kilometers upstream of the mouth (GPS coordinates 64° 49.570 N, 160° 39.990 W; Figure 2). In 2011 and 2012 Inglutalik tower operations focused on feasibility and no specific species were targeted for monitoring. The Inglutalik River tower operates from late June to mid-August.

North River Tower

North River flows 104 km out of the Nulato Hills. An important spawning tributary of Unalakleet River drainage, North River enters Unalakleet River 8 kilometers above the mouth. All Pacific salmon species return to North River except sockeye salmon; sockeye salmon return infrequently or in small numbers. ADF&G operated North River tower from 1972 to 1974 and again from 1984 to 1986 (Lean 1987). From 1984 to 1986, the North River tower project was conducted at various sites upstream from the confluence of the Unalakleet River. The project was discontinued in 1987 due to lack of funding and a decline in the chum salmon commercial fishery. The project resumed operations in 1996, largely as a result of available funding and increasingly important Chinook, pink, and coho salmon commercial fisheries. Kawerak, Inc. operated the tower project from 1996 to 2001 (Kohler 2002) and NVU operated the project from 2002–2004 (Jones 2006). During the 2007–2009 seasons, ADF&G personnel conducted tower operations with assistance from NVU (2007–2008) and NSEDC (2009). In 2010, NSEDC

became the sole operator. From 2008 to 2014 North River tower was located approximately 3 kilometers upstream from the confluence with the Unalakleet River (GPS coordinates N 63° 53.168, W160° 39.484; Figure 2). The tower operates from mid-June through mid-September.

Unalakleet River Weir

The Unalakleet River drainage encompasses 5,400 square km and extends westward from the Nulato Hills for approximately 210 km to Norton Sound. The 2010 season marked the inception of the Unalakleet River weir, a cooperative project between ADF&G, NVU, BLM, and NSEDC. Unalakleet River weir was installed on the mainstem approximately 22 kilometers upstream from the mouth (GPS coordinates 63 53.32′N, 160 29.41′W; Figure 2). Unalakleet River weir was primarily implemented to monitor Chinook salmon, although all Pacific salmon species except sockeye salmon return to Unalakleet River. The Unalakleet River weir operates from mid to late June to mid-August.

OBJECTIVES

Enumeration projects within the Norton Sound–Port Clarence Area had 2 tasks:

1. To obtain daily and seasonal estimates of timing and magnitude of salmon escapements, and
2. To estimate ASL composition of the Chinook, chum, coho, and sockeye salmon escapement.

METHODS

STUDY AREA

Norton Sound District consists of all waters from the tip of Cape Douglas south to Point Romanof and has 6 commercial salmon fishing subdistricts. Port Clarence District includes all waters from Cape Prince of Wales south to the tip of Cape Douglas and has 1 commercial fishing subdistrict, Grantley Harbor Subdistrict (Figure 3). Five species of Pacific salmon (chum salmon, pink salmon, Chinook salmon, sockeye salmon, and coho salmon) return to Norton Sound–Port Clarence Area marine waters and anadromous streams (Figure 3). Other salmonids, including Arctic grayling *Thymallus arcticus*, Dolly Varden *Salvelinus malma*, and whitefish species *Coregonus* and *Prosopium* spp. also occur in most Norton Sound–Port Clarence Area drainages.

ENUMERATION TOWERS

Tower Construction and Maintenance

Towers were constructed from aluminum scaffold and placed on the river bank where observers could see the width of the river. Guy wires were staked to the ground or cabled to trees to stabilize towers.

Flash panels (usually white plastic, vinyl, or canvas) were placed perpendicular across the river bottom to provide a contrasting background to help facilitate species identification and counting. Flash panels were anchored with sand bags placed on the upstream side of panels; stakes were used on the ends to hold panels in place. Flash panels were cleaned when needed using a stiff long-handled scrub brush or broom.

Partial or diversionary weirs were used to force migrating fish over the flash panel for easier observation. Diversionary weirs extended from the river bank opposite the tower scaffolding toward mid-channel over the flash panel end. Weirs were inspected daily and woody debris and fish carcasses removed. The North River counting project did not use a diversionary weir. Instead an orange buoy was placed mid-panel and counting was conducted from both sides of the river.

To count fish at night from late July into September, lights were placed either on the tower (Inglutalik, Kwiniuk, and Fish rivers) or on guy wires tied to both towers (North River). A 12-volt battery system or 120-volt generator system provided power for lighting.

Salmon Enumeration

Counting migrating salmon was completed 24 hours a day and each day was divided into three 8-hour shifts. At projects with towers on just 1 river bank (e.g., Inglutalik, Kwiniuk, and Fish rivers), salmon were counted, by species, for 20 min each hour; counts typically commenced at the top of the hour. At North River, where counting took place on both river banks, two 10-min counting periods were scheduled every hour. The first 10 min count commenced at the top of the hour on the west bank and included only fish passing between the west bank and the offshore buoy. The east bank count immediately followed the west bank count and only fish passing between the east bank and the mid-panel buoy were enumerated.

Passage was defined as movement across the full width of the flash panel and upstream (+) and downstream (-) passage were recorded to provide a net upstream passage during each 10 min for each channel of the river or 20 min count for the river. Carcasses as well as obviously moribund salmon passively moving downstream were not tallied as downstream passage. Hourly and daily salmon passage was determined using 3 different scenarios outlined in Perry-Plake and Antonovich (2009).

For days when all counts were conducted under excellent to poor conditions (Scenario 1), daily passage ($\hat{N}_d$), was calculated by expanding counts within a shift for day (*d*):

$$\hat{N}_d = \frac{M_d}{m_d} \sum_{j=1}^{m_d} y_{dj} \ . \tag{1}$$

Variance for each period was calculated as:

$$s_d^2 = \frac{1}{2(m_d - 1)} \sum_{j=2}^{m_d} \left(y_{dj} - y_{d(j-1)} \right)^2 , \tag{2}$$

and variance for the expanded daily passage was estimated as:

$$\hat{V}\left(\hat{N}_d\right) = \left(1 - \frac{m_d}{M_d}\right) M_d^2 \frac{s_d^2}{m_d} \ , \tag{3}$$

where:

d = day;

j = 20 min counting period or paired 10 min counting period (a paired 10 min counting period consists of 10 min counts, 1 per channel, during a given hour);

y = observed period count (both channels combined);

m = number of 20 min counting periods or paired 10 min counting periods sampled; and,

M = total number of possible 20 min counting periods or paired 10 min counting periods.

For periods with very poor or unobservable counts within a day (Scenario 2) the number of fish observed (y_{dj}), was estimated using known counts for that day and the estimated diurnal pattern. For each species, the period of peak passage was determined using the shortest, continuous period of time that accounted for 80% of the seasonal passage. If counts were conducted for a portion of the day that represents 25% or more of the expected passage for that day and if at least 25% of the periods during peak passage were successfully counted, then the channel-specific interpolated count was estimated:

$$y_{dc,\text{interp}} = y_{dc,\text{actual}} \times \frac{1 - p_{edp}}{p_{edp}}. \tag{4}$$

where:

$y_{dc,\text{interp}}$ = interpolated sum of counts for missing (i.e. very poor or unobservable) 10 min periods by channel;

$y_{dc,\text{actual}}$ = daily sum of successful 10 min counts by channel; and

p_{edp} = proportion of expected daily passage successfully counted.

The interpolated count was apportioned among the missing counting periods based on the diurnal pattern of the season. In Scenario 2, daily variance was adjusted by decreasing the number of counting periods (m_d), sampled each day by the proportion of the expected daily passage successfully counted on that day.

If counts were conducted for a portion of the day that represented less than 25% of the expected daily passage for that day or if less than 25% of the periods during peak passage were counted successfully (Scenario 3), then passage for the full day was estimated and the successful counts for that day were disregarded. Daily estimates were calculated using the same method for interpolating missed passage. When counts for consecutive days (k) were missed, the moving average estimate for the missing day (i) was calculated as:

$$\hat{N}_i = \frac{\sum_{j=i-k}^{i+k} I(\textit{counting was successfully conducted on day } j)\hat{N}_j}{\sum_{j=i-k}^{i+k} I(\textit{counting was successfully conducted on day } j)}, \tag{5}$$

$$\text{where } I(\cdot) = \begin{cases} 1 & \text{when the condition is true} \\ 0 & \text{otherwise} \end{cases} \text{ is an indicator function.} \quad (6)$$

The interpolated values were the point estimates for the daily counts and daily variance for missed days was the maximum variance for *k* days before and *k* days after the uncounted day (*i*). Total upstream passage and its variance combined daily passage from all 3 scenarios and were estimated as (Cochran 1977):

$$\hat{N}_{PT} = \sum_{d=1}^{D} \hat{N}_d \text{ ; and,} \quad (7)$$

$$\hat{V}\left(\hat{N}_{PT}\right) = \sum_{d=1}^{D} \hat{V}(\hat{N}_d) \quad (8)$$

Where *D* is the total number of possible days.

WEIRS

Fixed-picket weirs

Fixed-picket weirs were built across the entire river and designed to minimize unmonitored fish passage. Typically, weir sections were spanned using 3 meter long aluminum stringers supported by metal "A" frame bipods or tripods with galvanized steel or aluminum conduit pickets placed in the stringer holes. Pickets were spaced three-quarter inch apart to ensure all salmon and anadromous Dolly Varden could not pass upstream undetected. Fixed-picket weirs were equipped with a gate, usually in the thalweg of the river, to allow fish to pass while being counted. Additionally, pickets could be removed to allow fish to pass. Fixed-picket weirs had boat gates, consisting of removable panels that can be moved to accommodate boat passage. Lighting systems similar to those deployed on tower projects were used to illuminate the weir area for counting fish passage at night. All weirs were monitored several times a day for breaches such as substrate scouring and pushed up pickets.

Resistance Board Weirs

Resistance board or floating weirs have become increasingly important as a salmon stock assessment tool throughout western Alaska (Bavilla et al. 2010; Stewart et al. 2010; Whitton 2003). Floating weirs are comprised of a series of linked PVC pipe panels attached to a substrate rail anchored to the stream bed with rebar stakes and earth anchors. Installation of floating weirs followed installation methods outlined in Stewart (2003).

Similar to fixed-picket weirs, fish were funneled through a passage chute for accurate enumeration or into live traps to facilitate biological sampling. Unlike fixed-picket weirs, resistance board weirs had modified boat passage panels and tow rope systems that permitted unassisted boat traffic across the weir. Resistance board weirs also offered a flood-resistant alternative to fixed-picket weirs. When a resistant board weir was subjected to flood conditions, the panels were forced below the surface, allowing debris to pass unobstructed downstream.

Salmon Enumeration

Weirs were checked regularly throughout the day and night for milling fish and opened to allow fish to pass when necessary. Counting occurred at different times each day and night to account

for changes in diurnal migratory patterns or operational constraints such as suboptimal viewing conditions. When the weir was opened, staff monitored salmon migrating upstream. Fish were identified by species, and counted on multiple tally counters for a minimum of 30 min or until fish passage diminished. Individual counts of salmon passage throughout the night and day were added together for a total daily passage by species.

Methods for Interpolating Missed Counts

Missing daily counts for weirs were interpolated using the moving average method (equation 5) described in Perry-Plake and Antonovich (2009). Partial-count days were considered days of minimum passage therefore were not used to interpolate missed passage for days when the weir was not operational.

AGE, SEX, AND LENGTH

ASL Sample Size and Distribution

Minimum sample size targets were determined for each species of each project based on conventions described by Bromaghin (1993) to achieve 90% and 95% confidence intervals of age and sex compositions, respectively.

Sample size targets were based on assumptions that all salmon have 2 sex categories, Chinook salmon and sockeye salmon have 5 age categories, chum salmon have 4 age categories, and coho salmon have 3 age categories, with a finite or unknown population size. Minimum sample size targets were increased by 20–25% to account for unreadable scales and collection errors during weir or tower protocols (Table 1).

Different sampling strategies were implemented over the time frame of this report. Typically, pulse sampling was employed in situations where sampling events were more costly or required multiple individuals to collect samples. For example, pulse sampling was initiated at counting tower projects because sampling required capture of salmon in beach seines at remote sites not in proximity to the counting tower. Funding constraints and limited personnel allowed for only a handful of sampling events to achieved sampling goals. Pulse sampling was scheduled to occur over a range of dates corresponding to 5-year, 10-year, and/or long-term average run timing quartiles (e.g., Table 2). Pulse sampling was completed by dividing the sample goal by 4 and collecting the entire sample size within 2 days of the quartile date. The other sampling strategy was to collect ASL data evenly throughout the run following daily collection schedules (e.g., Table 3). This more systematic approach was used at weir projects because the weir trap facilitated daily capture and handling of salmon and often times only required a single individual to collect ASL samples. Small adjustments were also made inseason to daily sampling targets when observed run timing deviated significantly from expected run timing.

Age and sex compositions are provided only for those species and projects where sample size allows for 90% and 95% confidence intervals, respectively, given the actual escapement abundance observed (Table 4).

ASL Sample Collection Procedures

Samples were obtained from salmon caught in fish traps at weir sites and from salmon captured in beach seines in proximity to tower locations. If salmon were not effectively captured in the weir live trap, fish were seined in proximity to the weir site, using similar methods to tower-associated seining. During seining events, the seine was incrementally worked up onto a bank or

gravel bar until a net pen was created that was used to temporarily contain salmon until they could be sampled.

Weir traps consisted of an entrance gate, holding pen, and exit gate or chute. Salmon were trapped by opening the entrance gate while the exit gate remained closed. The holding pen was allowed to fill with fish until a reasonable number of salmon were available for sampling. Crew members used a dip net to capture fish within the holding pen or net pen. To obtain length data and aid in scale collection, fish were removed from the dip net and placed into a partially submerged fish cradle outfitted with a measuring tape, or onto a polyethylene foam-covered fish measuring board that beveled towards the center. After sampling, each fish was released upstream of the weir or several meters away from the net pen during seining events. The procedure was repeated until the holding pen or net pen was emptied or the required number of salmon was sampled.

An active sampling approach was implemented at the Unalakleet River weir in order to increase the effectiveness of sampling Chinook salmon. Chinook salmon are often reluctant to enter fish traps filled with pink and chum salmon, which occurs when the exit gate is closed. Active sampling consists of capturing and sampling salmon individually or in small numbers while actively passing and counting all salmon (Linderman et al. 2002). One crew member counted fish normally at the upstream end of the trap while a second crew member sat at the back of the trap observing fish as they entered through the fyke opening. When a Chinook salmon was observed entering the trap, the crew members concurrently closed the front and rear gates to trap the fish. Active sampling was also completed by a single crew member using a short length of 2x4 lumber secured to a piece of rope, such that the front and back gates could be closed simultaneously.

Sex of each sampled fish was determined by visually examining external characteristics (such as body symmetry, kype development, and presence of an ovipositor) and length was measured to the nearest 0.5 cm from mid eye to tail fork (METF). Scales were taken from the preferred area and cleaned and mounted on gummed cards, and impressions were made in cellulose acetate for age determination following methods described by Clutter and Whitesel (1956). Impressions were read with a microfiche reader and ages were determined from reading annuli as described by Mosher (1969). European notation was used to report ages: the first digit refers to the freshwater age not including the year spent in the gravel and the second digit refers to the ocean age (Koo 1962). Sex and length data were recorded on numbered data sheets that corresponded with numbers on the gum cards used for scale preservation. After sampling was completed, the original ASL gum cards, acetates, and ASL data forms were archived at the ADF&G office in Anchorage. In this report all collected ASL data are presented in tables; only ASL data that met minimum sample sizes are discussed.

WEATHER AND STREAM OBSERVATIONS

Stream and ambient air temperature (°C) and relative water levels were measured twice daily at all escapement projects. Stream and air temperatures were typically measured using a glass immersion thermometer. In some instances (e.g., Glacial Creek), water temperature was measured using a HOBO Water Temp Pro v2 logger. Other atmospheric observations (e.g., % cloud cover, wind speed and direction, and precipitation) were also recorded daily. Water levels were monitored using a staff gauge consisting of a metal rod driven into the stream channel with a meter stick attached. Relative height of the water surface, as measured from the

meter stick, represented the "stage" of the river above the original depth at which it was set. Occasionally, stream gauges needed to be re-driven in another location or lengthened when water levels either dropped below or rose above the meter stick.

RESULTS AND DISCUSSION

PILGRIM RIVER

Chum Salmon

Annual escapement of chum salmon at Pilgrim River weir was 47,557 fish in 2013 and 25,634 in 2014. The 2013 escapement was the highest in 10 years of weir counts and 2014 was similar to other years (Table 5).

Chum salmon were first observed approximately a week later in 2013 than 2014 and were present throughout the remainder of project operations in both years. The chum salmon median passage date was consistent between years and occurred at the beginning of August in both years (Appendices A1–A2).

Pilgrim River chum salmon ASL sample sizes were 194 in 2013 and 178 in 2014. Chum salmon were predominantly age-0.3 and age-0.4 fish in both years and a small number of age-0.5 chum salmon were present in 2014. The female composition was 42% in 2013 and 46% in 2014 (Appendix A3).

Pink Salmon

Annual escapement of pink salmon at Pilgrim River weir was 1,060 fish in 2013 and 4,197 salmon in 2014. The 2013 escapement was the second lowest and the 2014 was fifth lowest in 12 years of weir counts (Table 5).

Pink salmon were first observed approximately a week later in 2013 than 2014 before trailing off in mid-August in both years. Pink salmon median passage occurred in the third week of July in 2013 and approximately 10 days earlier in 2014 (Appendices A1–A2).

ASL samples were not collected for pink salmon at Pilgrim River weir.

Chinook Salmon

Annual escapement of Chinook salmon at Pilgrim River weir was 37 salmon in 2013 and 48 fish in 2014. These 2 years continue the longest consecutive record low escapements, which began in 2008, of Chinook salmon at Pilgrim River weir (Table 5).

Chinook salmon were first observed around the same time in both 2013 and 2014. In 2013, Chinook salmon were counted through the first week of August and were still passing the weir in mid-August in 2014. The median passage date of Chinook salmon occurred in the middle of July in both years (Appendices A1–A2).

ASL data for Chinook salmon were not collected in 2013 and 2014 (Appendix A4).

Coho Salmon

Annual escapement of coho salmon at Pilgrim River was 890 salmon in 2013 and 425 salmon in 2014. These 2 years represent some of the highest escapements in 10 years of weir counts (Table 5).

Coho salmon were first observed in early August in 2013 and in late July in 2014 and continued until operations ceased in both years. Coho salmon median passage occurred the second day of September in 2013 and was not estimated for 2014 because weir operations ceased before the entire coho salmon run was enumerated (Appendices A1–A2).

ASL data for coho salmon were not collected in 2013 and 2014 (Appendix A5).

Sockeye Salmon

Annual escapement of sockeye salmon at Pilgrim River was 12,428 fish in 2013 and 9,719 salmon in 2014. These escapements improved upon the trend of low runs in the previous 4 years (Table 5).

Sockeye salmon were first observed about a week later in 2013 than 2014 and persisted throughout the project operational period. However, the median passage of sockeye salmon in 2013 was 11 days earlier than in 2014 (Appendices A1–A2).

A total of 229 Pilgrim River sockeye salmon ASL samples were collected in 2013 and 199 were collected in 2014. In 2013, sockeye salmon were predominantly age-2.3 with age-1.3 and age-2.2 making up the second and third largest percentages. In 2014 age-1.2 was the predominant age class and age-2.3 made up 34% of the run (Appendix A6).

Environmental Conditions

From 2013–2014 water levels were within an acceptable range to allow for continuous weir operations (Figure 4; Appendix A7).

GLACIAL LAKE

Sockeye Salmon

Annual escapement of sockeye salmon at Glacial Creek was 2,544 salmon in 2013 and 4,211 salmon in 2014. The 2014 escapement was the fifth highest since the project's inception in 2000 (Table 6).

In 2013, sockeye salmon were detected by the camera on July 3 and in 2014 sockeye salmon were detected as soon as the weir was fish tight on June 30. Sockeye salmon were detected until the end of the project (August 8) in 2013 and approximately a week before the end of the project (August 7) in 2014. Sockeye salmon median passage occurred 5 days later in 2013 than in 2014 (Appendices B1–B2).

ASL data were not collected in 2013 and 2014 (Appendix B3).

Environmental Conditions

Salmon passage was monitored with an underwater camera, therefore water temperature was collected via a logger and stream level was not recorded (Appendix B4).

SNAKE RIVER

It is important to note that although Chinook and sockeye salmon were not present in large enough numbers to present results, a few were counted at Snake River weir in most years (Table 7).

Chum Salmon

Annual escapement of chum salmon at Snake River weir was 2,755 fish in 2013 and 3,983 salmon in 2014. Chum salmon escapements in 2013 and 2014 were near average (Table 7).

Chum salmon were first observed on July 12 in 2013 and about a week earlier on July 5 in 2014. Chum salmon median passage occurred days apart in the middle of July in both years (Appendices C1–C2).

Snake River chum salmon ASL samples were not collected in 2013 and did not meet minimum sample requirements in 2014 (Appendix C3).

Pink Salmon

Annual escapement of pink salmon at Snake River weir was 1,333 salmon in 2013 and 20,067 fish in 2014. The 2013 escapement was the fifth lowest escapement since project inception in 1995 and the 2014 escapement was modest for an even year (Table 7).

Pink salmon were first observed on July 12 in 2013 and the first day of the project in 2014 (July 5) and were present throughout the project duration in both years. Pink salmon median passage occurred about a week later in 2013 than in 2014 (Appendices C1–C2).

ASL samples were not collected for pink salmon at Snake River weir.

Coho Salmon

Annual escapement of coho salmon at Snake River weir in 2013 was 1,203 salmon and 1,424 fish in 2014. These escapements are similar to those from the late 1990s (Table 7).

Coho salmon were first observed in mid-July in 2013 and not until the end of July in 2014. Coho salmon were present throughout the remainder of the project in both years. Coho salmon median passage occurred in late August both years (Appendices C1–C2).

Snake River coho salmon ASL samples were not collected in 2013 and 2014 (Appendix C4).

Environmental Conditions

Environmental data were lost for 2013, but water levels were within an acceptable range to allow for continuous weir operations. Water levels in 2014 were within an acceptable range to allow for continuous weir operations (Figure 5; Appendix C5).

NOME RIVER WEIR

It is important to note that although Chinook and sockeye salmon are not present in large enough numbers to present results, a few were counted at Nome River weir in most years (Table 8).

Chum Salmon

Annual escapement of chum salmon at Nome River weir was 4,811 salmon in 2013 and 5,589 salmon in 2014. The 2014 escapement was the fourth highest since project inception and 2013 was similar to prior years (Table 8).

Chum salmon were first observed on the opening day of the project (July 5) in 2013 and 2014. Chum salmon median passage occurred in the third week of July in 2013 and about a week earlier in 2014 (Appendices D1–D2).

Nome River chum ASL sample sizes were 183 fish in 2013 and 180 fish in 2014. In both years age-0.3 chum salmon were the predominant age class and age-0.4 salmon were the next most abundant (Appendix D3). The sex composition was 61% and 60% female in 2013 and 2014, respectively.

Pink Salmon

Annual escapement of pink salmon at Nome River weir was 10,257 fish in 2013 and 96,397 salmon in 2014. Pink salmon escapements in both 2013 and 2014 were some of the lowest escapements since the early 2000s (Table 8).

Pink salmon were first observed on the opening day of the project (July 5) in both 2013 and 2014 and were present throughout the remainder of the project. Pink salmon median passage occurred in the last week of July in both 2013 and 2014 (Appendices D1–D2).

ASL samples were not collected for pink salmon at Nome River weir.

Coho Salmon

Annual escapement of coho salmon at Nome River weir was 2,624 salmon in 2013 and 2,637 salmon in 2014. The coho salmon escapements for 2013 and 2014 are within the range of escapements seen throughout the history of this project (Table 8).

Coho salmon were first observed in mid-July in 2013 and about a week later in 2014 and were present until operations ceased in both years. Coho salmon median passage occurred on August 26 in 2013 and a couple of days later (August 31) in 2014 (Appendices D1–D2).

Nome River coho salmon ASL sample size was insufficient to meet minimum sample requirements in 2013 and no samples were collected in 2014 (Appendix D4).

Environmental Conditions

Water levels in 2013 and 2014 were within acceptable ranges to allow for continuous weir operations (Figure 6; Appendix D5).

ELDORADO RIVER

It is important to note that although Chinook, coho, and sockeye salmon are not present in large enough numbers to present results, minor runs did exist in Eldorado River (Table 9).

Chum Salmon

Annual escapement of chum salmon at Eldorado River weir was 26,111 salmon in 2013 and 27,054 fish in 2014. The chum salmon escapement in 2013 and 2014 represent the third and second highest escapements since the project's inception in 1997 (Table 9).

Chum salmon were first observed in the beginning of July in 2013 and a week earlier in 2014. Chum salmon median passage occurred on July 16 in 2013 and was not estimated in 2014 because the project operational period was not fully monitored (Appendices E1–E2).

Eldorado River chum salmon ASL sample sizes were 198 fish in 2013 and 190 salmon in 2014. In both years age-0.3 were the predominant age class and age-0.4 were the next most abundant age class (Appendix E3). Sex composition of 34% and 37% female were observed in 2013 and 2014, respectively.

Pink Salmon

Annual escapement of pink salmon at Eldorado River weir was 1,029 salmon in 2013 and 46,746 salmon in 2014. The 2013 pink salmon escapement was within the range of values seen for odd-year escapements and the 2014 escapement was the lowest recorded during an even year (Table 9).

Pink salmon were observed over the entire operation of the weir in both 2013 and 2014. Pink salmon median passage in 2013 occurred on July 22 and could not be calculated for 2014 because the project operational period was not fully monitored (Appendices E1–E2).

ASL samples were not collected for pink salmon at Eldorado River weir.

Environmental Conditions

Water levels were within an acceptable range to allow for continuous weir operations in 2013 (Figure 7; Appendix E4). Environmental data were lost in 2014.

SOLOMON RIVER

It is important to note that although coho and sockeye salmon are not present in large enough numbers to present results, minor runs did exist in Solomon River (Table 10).

Chum Salmon

Annual escapement of chum salmon at Solomon River weir was 1,377 salmon in 2013 and 1,502 fish in 2014 (Table 10).

Chum salmon were observed on the first day of operations in 2013 and the third day of operations in 2014. In both years, chum salmon were present over the entire project season. Chum median passage occurred the third week of July in both years (Appendices F1–F2).

Solomon River chum salmon ASL samples were not collected in 2013 or 2014.

Pink Salmon

Annual escapement of pink salmon at Solomon River weir was 2,733 salmon in 2013 and 20,616 fish in 2014 (Table 10).

Pink salmon were first observed on July 7 in 2013 and were present throughout the season and pink salmon were first observed on July 5 in 2014 and the last was detected in mid-August. Pink salmon median passage occurred during the second half of July in both 2013 and 2014 (Appendices F1–F2).

ASL samples were not collected for pink salmon at Solomon River weir.

Environmental Conditions

Water levels in 2013 and 2014 were within acceptable ranges to allow for continuous weir operations (Figure 8; Appendix F3).

FISH RIVER

The first year of the project was in 2014 and only 1 side of the river was monitored throughout the project; therefore, interpolation of missed passage was only completed on that side and

escapement counts should be considered a minimum. Median passage dates were not calculated as the entire run for each species was not fully monitored.

Chum Salmon

Annual escapement of chum salmon at Fish River tower was 63,348 salmon in 2014 (Table 11).

Chum salmon were first observed on the second day of project operations and were present throughout the rest of the season in 2014 (Appendix G1).

Fish River chum salmon ASL samples were not collected in 2014.

Pink Salmon

Annual escapement of pink salmon at Fish River tower was 312,498 fish in 2014 (Table 11).

Pink salmon were observed from June 18, the second day of project operations, until mid-August, about 10 days before operations ended for the season (Appendix G1).

ASL samples were not collected for pink salmon at Fish River tower.

Chinook Salmon

Annual escapement of Chinook salmon at Fish River tower was 1,205 salmon 2014 (Table 11).

Chinook salmon were observed from late June until mid-July (Appendix G1).

ASL samples were not collected for Chinook salmon at Fish River tower.

Coho Salmon

Annual escapement of coho salmon at Fish River tower was 18,278 fish in 2014 (Table 11).

Coho salmon were first observed on July 9 and were present through the remainder of project operations (Appendices G1).

Fish River coho salmon ASL samples were not collected in 2014 (Appendix G3).

Environmental Conditions

In 2014, high water in Fish River from July 15 to July 25 rendered the project inoperable (Figure 9; Appendix G4).

KWINIUK RIVER

Chum Salmon

Annual escapement of chum salmon at Kwiniuk River tower was 5,625 salmon in 2013 and 39,774 fish in 2014. The 2013 escapement was one of the lowest on record and the 2014 escapement was the third highest since 1995 (Table 12).

Chum salmon were observed from the beginning of the season in the third week of June until the first week of August in 2013. In 2014 chum salmon were observed from mid-June until the end of the first week of August. Chum salmon median passage occurred on July 13 in 2013 and a week earlier in 2014 (Appendices H1–H2).

Kwiniuk River chum salmon ASL sample size was 202 fish in 2013. Age composition was predominantly age-0.3 and age-0.4. Approximately 58% of the sampled fish were female in 2013. No chum salmon ASL data were collected in 2014 (Appendix H3).

Pink Salmon

Annual escapement of pink salmon at Kwiniuk River tower was 13,212 fish in 2013 and 322,830 salmon in 2014. The 2013 escapement was the lowest odd-year count since 2001 and 2014 was the lowest even-year escapement of pink salmon since 1988 (Table 12).

In both 2013 and 2014 pink salmon were present from the first day of project operations until the third week of August. Pink salmon median passage occurred on July 24 in 2013 and about 2 weeks earlier in 2014 (Appendices H1–H2).

ASL samples were not collected for pink salmon at Kwiniuk River tower.

Chinook Salmon

Annual escapement of Chinook salmon at Kwiniuk River tower was 15 salmon in 2013 and 438 fish in 2014. The 2013 escapement of 15 Chinook salmon was the lowest since 1979 and the 2014 escapement was within historical escapements (Table 12).

Chinook salmon were observed in late June through July in both 2013 and 2014. Chinook salmon median passage occurred on July 5 in 2014 (Appendices H1–H2).

ASL samples were not collected in 2013 and 2014 for Chinook salmon at Kwiniuk River tower (Appendix H4).

Coho Salmon

Annual escapement of coho salmon at Kwiniuk River tower was 3,729 fish in 2013 and 14,637 salmon in 2014. The 2013 coho escapement was the third lowest since 2001 and the 2014 escapement was within historical values (Table 12).

Coho salmon were first observed on July 20 in 2013 and a few days earlier in 2014. Coho salmon median passage was consistent between years and occurred in mid-August (Appendices H1–H2).

ASL samples were not collected in 2013 and 2014 for coho salmon at Kwiniuk River tower (Appendix H5).

Environmental Conditions

Water levels in 2013 and 2014 were within acceptable ranges to allow for continuous tower operations (Figure10; Appendix H6).

INGLUTALIK RIVER

It is important to note that although coho salmon are present during tower operations, the total run of coho salmon is not monitored therefore escapements should be considered minimum estimates. Also staffing issues in 2013 and high water in 2014 which rendered the counting tower inoperable in mid-July resulted in the target operational period of the project not being fully monitored in either year therefore escapements should be considered minimums (Table 13).

Chum Salmon

Annual escapement of chum salmon at Inglutalik River tower was 51,099 salmon in 2013 and 62,153 fish in 2014 (Table 13).

The first chum salmon was observed at Inglutalik River tower at the start of operations in both 2013 and 2014 and were present throughout the project in 2013 (Appendices I1–I2).

Chum salmon ASL samples collected in 2013 indicated 46% female but did not meet minimum sample size for age composition analysis. ASL samples were not collected in 2014 (Appendix I3).

Pink Salmon

Annual escapement of pink salmon at Inglutalik River tower was 201,438 salmon in 2013 and 61,752 salmon in 2014 (Table 13).

The first pink salmon was observed at Inglutalik River tower about 5 days from the start of the project in 2013 and the second day of operations in 2014 (Appendices I1–I2). Pink salmon were observed in both years until cease of operations.

ASL samples were not collected for pink salmon at Inglutalik River tower.

Chinook Salmon

Annual escapement of Chinook salmon at Inglutalik River tower was 3,411 fish in 2013 and 1,676 salmon in 2014 (Table 13).

The first Chinook salmon was observed at Inglutalik River tower the second day of operations, June 22, in 2013 and the first day of operations in 2014 (Appendices I1–I2).

ASL samples were not collected for Chinook salmon at Inglutalik River tower.

Environmental Conditions

Water levels were not collected in 2013 and 2014 (Appendix I4).

NORTH RIVER

Chum Salmon

Annual escapement of chum salmon at North River tower was 11,201 fish in 2013 and 13,872 salmon in 2014. The 2013 and 2014 chum salmon escapements were within the range of historical escapements (Table 14).

Chum salmon were first observed in late June in both 2013 and 2014 and were present throughout operations in both years. Chum salmon median passage occurred in late July in 2013 and about 10 days earlier in 2014 (July 15; Appendices J1–J2).

North River chum salmon 2013 ASL samples did not meet minimum sample size requirements for analysis. No ASL data were collected in 2014 (Appendix J3).

Pink Salmon

Annual escapement of pink salmon at North River tower was 48,097 salmon in 2013 and 246,075 fish in 2014. The 2013 pink salmon escapement was the second lowest escapement since 1996 and the 2014 escapement was in line with historical even-year escapements (Table 14).

Pink salmon were observed at the start of operations in 2013 and about 6 days after the start of operations in 2014. In 2013 pink salmon were present throughout the entire project and in 2014

they were present only until the middle of August. Pink salmon median passage occurred on July 21 in 2013 and about 8 days earlier in 2014 (Appendices J1–J2).

ASL samples were not collected for pink salmon at North River tower.

Chinook Salmon

Annual escapement of Chinook salmon at North River tower was 580 fish in 2013 and 3,454 salmon in 2014. The 2013 Chinook salmon escapement was the lowest since 1996 and the 2014 Chinook salmon escapement was the highest since 1997 (Table 14).

Chinook salmon were observed from late June until the first week of August in both 2013 and 2014. Chinook salmon median passage occurred July 17 in 2013 and 8 days earlier in 2014 (Appendices J1–J2).

ASL samples collected for Chinook salmon at North River tower in 2013 met only sex composition minimum sample size requirement and female composition was 21%. ASL samples collected in 2014 did not meet minimum sample size requirements for sex and age composition analyses (Appendix J4).

Coho Salmon

Annual escapement of coho salmon at North River tower was 9,115 fish in 2013 and 4,995 salmon in 2014. The 2013 and 2014 coho salmon escapements were similar to escapements from the late 1990s and early 2000s (Table 14).

Coho salmon were first observed in the third week of July in 2013 and about 5 days later in 2014. Coho salmon were present through the remainder of project operations in both years. Coho salmon median passage occurred in mid-August in both 2013 and 2014 (Appendices J1–J2).

Coho salmon ASL samples were not collected in 2013–2014 (Appendix J5).

Environmental Conditions

Water levels in 2013 were within an acceptable range to allow for continuous operation of the tower. In 2014, high water rendered the tower inoperable for 12 days in July (Figure 11; Appendix J6).

UNALAKLEET RIVER

It is important to note that although sockeye salmon are not present in large enough numbers to present results, minor runs did exist in Unalakleet River (Table 15). High water in 2014 delayed project installation by about 10 days and therefore escapement estimates should be considered minimum counts.

Chum Salmon

Annual escapement of chum salmon at Unalakleet River weir was 106,715 salmon in 2013 and 55,341 fish in 2014 (Table 15).

Chum salmon were observed from the first day of project operations in both 2013 and 2014 and were observed throughout the season in both years. Chum salmon median passage occurred on July 13 in 2013 and was not calculated in 2014 because the target operational period was not fully monitored (Appendices K1–K2).

Unalakleet River chum salmon ASL sample sizes were 204 in 2013 and 213 in 2014. Female composition was similar, 54% in 2013 and 52% in 2014. Age-0.3 fish were the predominant age class in 2013 and age-0.4 fish were the majority in 2014 (Appendix K3).

Pink Salmon

Annual escapement of pink salmon at Unalakleet River weir was 143,250 salmon in 2013 and 1,194,708 fish in 2014 (Table 15).

Pink salmon were first observed at the start of project operations and were present throughout operations in both 2013 and 2014. Pink salmon median passage occurred on July 23 in 2013 and was not calculated in 2014 because the target operational period was not fully monitored (Appendices K1–K2).

ASL samples were not collected for pink salmon at Unalakleet River weir.

Chinook Salmon

Annual escapement of Chinook salmon at Unalakleet River weir was 667 fish in 2013 and 1,126 salmon in 2014 (Table 15).

Chinook salmon were first observed at the start of project operation in both 2013 and 2014 and were present until August 1 in 2013 and July 15 in 2014. Chinook salmon median passage occurred on July 11 in 2013 and was not calculated in 2014 because the target operational period was not fully monitored (Appendices K1–K2).

Unalakleet River Chinook ASL sample sizes were 97 in 2013 and 165 in 2014. In 2013, ASL samples met only the sex composition sample size requirements; female composition was 52%. In 2014 sample sizes met all minimum requirements. Age-1.3 was the predominant age class and age-1.4 fish was the next highest percentage (Appendix K4).

Coho Salmon

Annual escapement of coho salmon at Unalakleet River weir was 25,550 fish in 2013 and 44,524 salmon in 2014 (Table 14). Project operations do not encompass the entire coho salmon run and these should be considered minimum estimates.

Coho salmon were first observed at the beginning of July and were present for the remainder of project operations in both 2013 and 2014 (Appendices K1–K2).

ASL samples were not collected for coho salmon at Unalakleet River weir.

Environmental Conditions

Water levels in 2013 were within acceptable ranges to allow for continuous weir operations. In 2014 high water delayed the installation of the weir and also hindered operations the third week of July (Figure 12; Appendix K5).

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TABLES AND FIGURES

Table 1.–Target ASL sample sizes for Norton Sound escapement projects.

Escapement Project	Species	Sample Size
Pilgrim weir	Chum	220
	Sockeye	230
Glacial weir	Sockeye	204
Snake weir	Chum	210
	Coho	190
Nome weir	Chum	210
	Coho	190
Eldorado weir	Chum	220
Kwiniuk tower	Chum	220
Inglutalik tower	Chinook	230
	Chum	220
	Coho	200
North tower	Chinook	100
	Chum	215
	Coho	200
Unalakleet weir	Chinook	230
	Chum	215

Note: Sample sizes include a 20% buffer to account for unreadable scales. Scale samples were not collected at Solomon and Fish river projects.

Table 2.–Example of pulse sampling for chum salmon, Kwiniuk River tower, Norton Sound, 2013.

	Quartile date	Sampling period dates	Pulse sample size	Cumulative sample total
Quarter point	7/4	6/25- 7/04	55	55
Midpoint	7/8	7/05 - 7/08	55	110
Three-quarter point	7/14	7/09- 7/14	55	165
~90% point	7/22	7/15 - 7/22	55	220

Table 3.–Example of daily sampling goals for chum salmon, Nome River weir, Norton Sound, 2013.

	Quartile date	Sampling period dates	Number of samples collected/day	Cumulative sample total
Quarter point	7/17	7/5 - 7/17	4	52
Midpoint	7/24	7/18 - 7/24	8	108
Three-quarter point	8/4	7/25 - 8/4	5	160
~90% point	8/14	8/5 -8/14	5	212

Table 4.–Age and sex minimum sample sizes for Norton Sound escapement projects required for age and sex composition estimates with 90% and 95% confidence intervals, respectively.

Escapement project	Species	Year	
		2013	2014
Pilgrim weir	Chum	151/73	151/73
	Sockeye	157/72	156/72
Glacial weir	Sockeye	144*/69*	145*/70*
Snake weir	Chum	143*/71*	144*/71*
	Coho	127*/70*	118*/67*
Nome weir	Chum	144/71	145/72
	Coho	131*/71*	130*/70*
Eldorado weir	Chum	151/73	151/73
Kwiniuk tower	Chum	151/73	150/73
Inglutalik tower	Chinook	143*/69*	139*/68*
	Chum	151*/73	151*/73*
	Coho	124*/69*	134*/72*
North tower	Chinook	142*/69	142*/69*
	Chum	151*/73*	151*/73*
	Coho	139*/72*	136*/72*
Unalakleet weir	Chinook	137*/68	137/68
	Chum	151/73	151/73

Note: Age minimum sample sizes are to the left of each common slash and sex minimum sample sizes are to the right of each common slash. Asterisk indicates the target sample size was not achieved.

Table 5.–Historical salmon escapements and median passage (Med. pass.) dates, Pilgrim River weir, Port Clarence, 2003–2014.

Year	Operating period	Chum salmon		Pink salmon		Chinook salmon		Coho salmon		Sockeye salmon	
		Number	Med. pass.	Number	Med. pass.	Number	Med. pass.	Number	Med. pass.	Number	Med. pass.
2003	Jun 21–Sep 14	15,200	8/3	14,100	7/24	1,016	7/13	677	8/26	42,729	7/17
2004	Jun 21–Sep 14	10,239	7/23	50,760	7/14	925	7/9	1,573 [a]	8/22 [a]	85,417	7/11
2005	Jun 24–Sep 05	9,685	7/30	13,218	7/18	216	7/13	304	8/25	55,951	7/14
2006	Jun 30–Sep 09	45,361	8/2	17,701	7/23	275	7/22	973	9/3	52,323	7/19
2007	Jun 29–Sep 10	35,334	7/31	3,616	7/22	501	7/13	605	8/20	43,432	7/15
2008	Jun 25–Sep 01	24,550	8/2	92,471	7/22	137	7/19	260	8/21	20,452	7/17
2009	Jun 26–Aug 31	5,427	8/2	483	7/28	52	7/28	18	–	953	7/22
2010	Jun 24–Sep 01	25,379	8/4	29,239	7/22	44	7/28	272	8/21	1,654	7/25
2011	Jun 28–Sep 01	41,740	7/30	3,364	7/31	44	7/20	269	8/27	8,449	7/19
2012 [b]	Jun 26–Aug 19	25,733		46,201		65		95		7,090	
2013	Jun 27–Sep 08	47,557	8/3	1,060	7/24	37	7/18	890	9/2	12,428	7/12
2014	Jun 25–Aug 26	25,634	8/2	4,197	7/14	48	7/14	425	[c]	9,719	7/23

Note: En dash means the median passage not calculated for less than 20 fish.

[a] Count and median passage date are unreliable due to misidentification; approximately 30% of scale samples were sockeye salmon.

[b] Median passage dates not shown because target operational period for project was not fully monitored. Escapements should be considered minimum estimates.

[c] Median passage date for coho salmon not calculated because entire run was not counted. Escapement should be considered a minimum estimate.

Table 6.–Historical salmon escapements and median passage (Med. pass.) dates at Glacial Lake weir, Norton Sound, 2000–2014.

		Sockeye salmon	
Year	Operating period	Number	Med. pass.
2000	Jul 12–Jul 30	884	7/21
2001	Jul 02–Jul 28	2,487	7/12
2002	Jun 25–Jul 26	1,047	7/11
2003	Jun 24–Jul 28	2,004	7/8
2004	Jun 18–Jul 25	8,115	7/2
2005	Jun 20–Jul 25	11,135	6/30
2006	Jul 04–Jul 18	6,849	7/12
2007	Jul 05–Jul 20	4,533	7/10
2008	Jun 27–Jul 28	1,794	7/8
2009	Jun 20–Jul 27	826	7/12
2010	Jun 26–Jul 28	1,047	7/13
2011	Jun 28–Jul 26	1,697	7/9
2012	Jul 02–Jul 31	1,602	7/17
2013	Jun 30–Aug 12	2,544	7/11
2014	Jun 30–Aug 07	4,211	7/6

Table 7.–Historical salmon escapements, standard errors (SE), and median passage (Med. pass.) dates at Snake River counting tower (1995–2002) and weir (2003–2014), Norton Sound.

		Chum salmon			Pink salmon			Chinook salmon			Coho salmon			Sockeye salmon	
Year	Operating period	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	Med. pass.
1995	Jul 01–Aug 18	4,393	[a]	7/22	917	[a]	7/30	0	[a]		856	[a]	8/13	[b]	[b]
1996	Jul 03–Aug 22	2,772	[a]	7/11	44,558	[a]	7/19	5	[a]	–	1,638	[a]	8/7	[b]	[b]
1997	Jul 07–Aug 18	6,184	[a]	7/23	6,742	[a]	7/28	12	[a]	–	1,157	[a]	8/13	[b]	[b]
1998	Jul 01–Aug 11	11,067	[a]	7/17	219,679	[a]	7/18	0	[a]		178	[a]	8/8	[b]	[b]
1999	Jul 01–Aug 14	484	[a]	7/30	116	[a]	8/7	20	[a]	8/10	90	[a]	8/10	[b]	[b]
2000	Jun 29–Aug 25	1,911	[a]	7/15	4,723	[a]	7/22	28	[a]	8/9	406	[a]	8/11	[b]	[b]
2001	Jul 08–Sep 05	2,182	[a]	7/20	1,295	[a]	8/3	33	[a]	8/18	1,335	[a]	8/24	[b]	[b]
2002	Jun 28–Sep 16	2,776	[a]	7/15	4,103	[a]	7/16	9	[a]	–	851	[a]	9/2	8	–
2003	Jun 26–Sep 11	2,201	NA	7/25	2,856	NA	7/30	50	NA	8/9	489	NA	8/23	84	8/11
2004	Jun 23–Sep 03	2,146	NA	7/13	126,917	NA	7/17	17	NA	–	474	NA	[c]	22	8/20
2005	Jun 27–Sep 11	2,967	NA	7/18	13,813	NA	7/23	31	NA	8/11	2,948	NA	8/28	275	8/15
2006	Jul 01–Sep 11	4,160	NA	7/19	74,028	NA	7/21	32	NA	8/16	4,776	NA	8/24	302	8/20
2007	Jul 01–Sep 11	8,147	NA	7/23	4,634	NA	7/25	61	NA	8/20	1,781	NA	8/26	1,354	9/2
2008	Jul 06–Sep 06	1,244	NA	7/26	145,761	NA	7/23	13	NA	–	5,206	NA	8/31	143	8/30
2009	Jul 08–Aug 30	891	NA	7/25	769	NA	7/25	6	NA	–	50	NA	[c]	2	–
2010	Jul 03–Sep 11	6,973	NA	7/24	51,099	NA	7/23	43	NA	8/15	2,243	NA	9/3	124	8/26
2011	Jul 09–Sep 11	4,352	NA	7/20	7,090	NA	7/25	1	NA	–	343	NA	8/29	14	–
2012	[d] Jul 06–Aug 15	978	NA		8,601	NA		1	NA		22	NA		3	
2013	Jul 09–Sep 10	2,755	NA	7/20	1,333	NA	8/1	8	NA	–	1,203	NA	8/27	163	[e]
2014	Jul 05–Sep 10	3,983	NA	7/16	20,067	NA	7/23	11	NA	–	1,424	NA	8/31	86	8/9

Note: En dash means the median passage not calculated for less than 20 fish.

[a] Standard errors on tower counts (1995–2002) are being recovered.

[b] Enumeration of sockeye salmon began in mid-July 2002, after a fixed picket weir replaced the counting tower.

[c] Aerial survey estimates in 2004 and 2009 were 1,916 and 700 coho salmon, respectively. These surveys were flown under excellent viewing conditions. Weir counts of coho salmon were lower in these years because pickets were pulled to relieve pressure on the weir during flood conditions and the majority of coho salmon escaped without being enumerated. Escapements should be considered minimum estimates and median passages were not estimated.

[d] Median passage dates not shown because target operational period for the project was not fully monitored. Escapements should be considered minimum estimates.

[e] Median passage not shown because the majority of sockeye salmon were counted over 2 days.

Table 8.–Historical salmon escapements, standard errors (SE), and median passage (Med. pass.) dates at Nome River counting tower (1993–1995) and weir (1996–2014), Norton Sound.

			Chum salmon			Pink salmon			Chinook salmon			Coho salmon			Sockeye salmon	
Year		Operating period	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	Med. pass.
1993	[a]	Jul 25–Aug 28	1,859	[b]		13,036	[b]		63	[b]		4,349	[b]		[c]	[c]
1994		Jun 24–Aug 15	2,969	[b]	7/15	142,604	[b]	7/23	54	[b]	7/19	726	[b]	8/4	[c]	[c]
1995		Jun 22–Sep 06	5,093	[b]	7/20	13,893	[b]	7/30	5	[b]	–	1,650	[b]	8/22	[c]	[c]
1996	[a]	Jun 26–Jul 23	3,339	NA		95,681	NA		5	NA		66	NA		[c]	[c]
1997		Jun 27–Aug 27	5,147	NA	7/19	8,035	NA	7/29	22	NA	7/18	321	NA	8/13	[c]	[c]
1998	[a]	Jul 01–Aug 11	1,930	NA		359,469	NA		70	NA		96	NA		[c]	[c]
1999		Jul 02–Aug 25	1,048	NA	7/31	2,033	NA	8/7	3	NA	–	417	NA	8/19	6	–
2000		Jun 29–Aug 25	4,056	NA	7/18	41,673	NA	7/23	25	NA	8/16	698	NA	8/20	19	–
2001		Jul 08–Sep 11	2,859	NA	7/21	3,138	NA	8/4	7	NA	–	2,418	NA	8/27	55	8/4
2002		Jun 29–Sep 11	1,720	NA	7/17	35,057	NA	7/17	7	NA	–	3,418	NA	8/30	29	8/4
2003		Jul 05–Sep 10	1,957	NA	7/26	11,402	NA	7/30	12	NA	–	548	NA	8/28	47	8/11
2004		Jun 25–Sep 08	3,903	NA	7/16	1,051,146	NA	7/15	51	NA	7/27	2,283	NA	8/27	114	8/21
2005		Jun 27–Sep 11	5,584	NA	7/18	285,759	NA	7/21	69	NA	8/9	5,848	NA	8/28	381	8/25
2006		Jul 02–Sep 07	5,677	NA	7/14	578,555	NA	7/14	43	NA	8/13	8,308	NA	8/26	196	7/17
2007		Jul 04–Sep 16	7,034	NA	7/23	24,395	NA	7/29	13	NA	–	2,437	NA	8/23	534	9/1
2008		Jul 02–Sep 17	2,607	NA	7/26	1,186,554	NA	7/24	28	NA	7/13	4,605	NA	8/30	90	8/12
2009		Jul 03–Sep 20	1,565	NA	7/28	16,490	NA	7/26	10	NA	–	1,370	NA	8/28	103	7/29
2010		Jun 30–Sep 16	5,877	NA	7/24	165,934	NA	7/22	9	NA	–	4,114	NA	8/30	43	8/11
2011		Jul 06–Sep 12	3,578	NA	7/21	14,384	NA	7/29	12	NA	–	1,831	NA	8/30	22	9/6
2012	[a]	Jul 05–Aug 15	2,028	NA		151,791	NA		6	NA		237	NA		48	
2013		Jul 05–Sep 16	4,811	NA	7/23	10,257	NA	7/25	14	NA	–	2,624	NA	8/26	38	8/17
2014		Jul 05–Sep 11	5,589	NA	7/17	96,397	NA	7/26	8	NA	–	2,637	NA	8/31	34	8/7

Note: En dash means the median passage not calculated for less than 20 fish.

[a] Median passage dates not shown because target operational period for project was not fully monitored. Escapements should be considered minimum estimates.

[b] Standard errors for tower counts (1993–1995) are being recovered.

[c] Enumeration of sockeye salmon began in 1999.

Table 9.–Historical salmon escapements, standard errors (SE), and median passage (Med. pass.) dates at Eldorado River counting tower (1997–2002) and weir (2003–2014), Norton Sound.

		Chum salmon			Pink salmon			Chinook salmon			Coho salmon			Sockeye salmon	
Year	Operating period	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	Med. pass.
1997	Jun 29–Aug 19	14,302	[a]	7/15	1,022	[a]	8/9	98	[a]	7/16	194	[a]	8/9		
1998	Jun 29–Aug 12	13,808	[a]	7/12	137,283	[a]	7/13	[b]	[a]	[b]	21	[a]	8/9		
1999	Jul 10–Sep 01	4,218	[a]	7/19	977	[a]	8/9	28	[a]	7/21	510	[a]	8/25		
2000	Jun 29–Aug 25	11,617	[a]	7/10	55,992	[a]	7/12	33	[a]	7/9	192	[a]	8/19		
2001	Jul 08–Sep 13	11,635	[a]	7/14	488	[a]	8/7	50	[a]	7/19	1,509	[a]	9/2		
2002	Jun 24–Sep 10	10,215	[a]	7/10	119,098	[a]	7/10	26	[a]	7/8	540	[a]	9/6	10	–
2003	Jun 21–Sep 08	3,591	NA	7/17	173	NA	7/24	29	NA	7/18	115	NA	8/26	0	–
2004	Jun 22–Sep 09	3,277	NA	7/9	60,866	NA	7/11	25	NA	7/15	1,151	NA	9/1	57	8/27
2005	Jun 23–Sep 02	10,369	NA	7/15	12,356	NA	7/22	32	NA	8/10	689	NA	8/28	10	–
2006	Jun 26–Aug 03	42,105	NA	7/15	222,348	NA	7/17	41	NA	7/12	55	NA	7/29	1	–
2007	Jun 26–Aug 03	21,312	NA	7/14	833	NA	7/21	14	NA	–	2	NA	–	22	7/31
2008	Jun 27–Jul 31	6,746	NA	7/13	244,641	NA	7/19	36	NA	7/13	38	NA	7/27	3	–
2009	Jul 02–Aug 03	4,943	NA	7/18	1,119	NA	7/23	31	NA	7/23	2	NA	–	0	–
2010	[c] Jun 30–Jul 24	21,211	NA		48,136	NA		23	NA		2	NA		8	
2011	Jul 01–Aug 03	16,273	NA	7/12	507	NA	7/31	3	NA	–	1	NA	–	0	–
2012	[c] Jul 02–Jul 25	13,348	NA		59,318	NA		0	NA		1	NA		0	
2013	Jun 29–Aug 05	26,111	NA	7/16	1,029	NA	7/22	9	NA	–	15	NA	–	0	–
2014	[c] Jun 23–Jul 27	27,054	NA		46,746	NA		18	NA		0	NA		0	

Note: En dash means the median passage not calculated for less than 20 fish.

[a] Standard errors for tower counts (1993–1995) are being recovered.

[b] 1998 Eldorado River Chinook salmon count of 446 fish was not considered reliable and no median passage date was estimated.

[c] Median passage dates not shown because target operational period for project was not fully monitored. Escapement counts should be considered minimum estimates.

Table 10.–Salmon escapements and median passage (Med. pass.) dates at the Solomon River weir, 2013–2014.

		Chum salmon		Pink salmon		Coho salmon		Sockeye salmon	
Year	Operating period	Number	Med. pass.	Number	Med. pass.	Number	Med. pass.	Number	Med. pass.
2013	Jul 5–Aug 26	1,377	7/21	2,733	7/24	168	[a]	3	–
2014	Jul 2–Aug 20	1,502	7/20	20,616	7/21	79	[a]	0	–

Note: En dash means the median passage not calculated for less than 20 fish.

[a] Median passage date for coho salmon not shown because entire run was not counted. Escapement should be considered a minimum estimate.

Table 11.–Salmon escapements and standard errors (SE) at Fish River counting tower, Norton Sound, 2014.

		Chum salmon		Pink salmon		Chinook salmon		Coho salmon	
Year	Operating period	Number	SE	Number	SE	Number	SE	Number	SE
2014 [a]	Jun 18–Aug 31	63,348	1,766	312,498	6,854	1,205	89	18,278	654

[a] Counting was predominantly completed on 1 bank of the river therefore interpolation of missed counts was only completed for that bank and total escapement should be considered a minimum estimate. Median passage dates not shown because entire run was not fully monitored.

Table 12.–Historical salmon escapements, standard errors (SE), and median passage (Med. pass.) dates at the Kwiniuk River counting tower, Norton Sound, 1965–2014.

		Chum salmon			Pink salmon			Chinook salmon			Coho salmon		
Year	Operating period	Number	SE	Med. pass.	Number	SE	Med. pass.	Number[b]	SE	Med. pass.	Number	SE	Med. pass.
1965	Jun 18–Jul 19	32,860	[a]	–	8,643	[a]	–	19	[a]	–	ND		–
1966	Jun 19–Jul 28	32,751	[a]	–	10,933	[a]	–	7	[a]	–	ND		–
1967	Jun 18–Jul 28	26,436	[a]	–	3,615	[a]	–	13	[a]	–	ND		–
1968	Jun 18–Jul 24	18,993	[a]	–	129,150	[a]	–	26	[a]	–	ND		–
1969	Jun 26–Jul 26	19,800	[a]	–	57,509	[a]	–	12	[a]	–	ND		–
1970	Jun 25–Jul 29	68,527	685	–	235,371	2,354	–	ND		–	ND		–
1971	Jun 29–Jul 29	39,206	392	–	16,599	166	–	ND		–	ND		–
1972	Jun 28–Jul 27	30,922	309	–	62,526	625	–	ND		–	ND		–
1973	Jun 25–Jul 25	28,837	288	–	38,466	385	–	ND		–	ND		–
1974	Jun 20–Jul 26	36,183	362	–	40,858	409	–	ND		–	ND		–
1975	July 04–Jul 26	14,454	145	–	57,318	573	–	ND		–	ND		–
1976	July 04–Jul 25	6,914	69	–	27,735	277	–	ND		–	ND		–
1977	Jun 26–Jul 25	22,890	229	–	46,156	462	–	ND		–	ND		–
1978	Jul 04–Jul 22	11,298	113	–	73,727	737	–	ND		–	ND		–
1979	Jun 28–Jul 25	12,189	122	–	168,732	1,687	–	ND		–	ND		–
1980	Jun 22–Jul 28	19,538	195	–	325,905	3,259	–	ND		–	ND		–
1981	Jun 19–Aug 02	34,309	686	7/9	555,723	11,114	7/21	ND		7/4	ND		NA
1982	Jun 21–Jul 26	42,023	840	7/5	455,366	9,107	7/8	ND		7/7	ND		NA
1983	Jun 19–Jul 27	52,914	1,587	7/5	166,197	3,324	7/19	ND		7/3	ND		NA
1984	Jun 19–Jul 25	53,195	1,596	7/3	720,226	36,011	7/10	ND		7/11	ND		NA
1985	Jun 26–Jul 28	9,859	197	7/13	18,087	3,617	7/16	959	173	7/20	ND		NA
1986	Jun 19–Jul 26	85,908	3,436	7/5	831,031	49,862	7/8	2390	191	7/5	ND		NA
1987	Jun 25–Jul 23	16,306	326	7/6	5,665	227	7/17	266	8	7/13	ND		NA
1988	Jun18–Jul 26	13,313	799	6/30	19,482	584	7/11	318	92	7/10	ND		NA
1989	Jun 27–Jul 27	9,758	195	7/3	28,796	288	7/16	245	15	7/7	54	4	[c]
1990	Jun 21–Jul 25	14,052	281	7/4	774,586	775	7/8	940	94	7/2	ND		NA
1991	Jun 18–Jul 27	19,731	592	7/12	53,541	1,071	7/23	578	52	7/3	ND		NA
1992	Jun 27–Jul 28	23,228	2,555	7/8	1,186,630	177,995	7/17	455	18	7/16	ND		NA
1993	Jun 27–Jul 27	15,888	318	7/11	43,341	867	7/20	683	61	7/9	ND		NA

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Year	Operating period	Chum salmon			Pink salmon			Chinook salmon			Coho salmon		
		Number	SE	Med. pass.	Number	SE	Med. pass.	Number[b]	SE	Med. pass.	Number	SE	Med. pass.
1994	Jun 23–Aug 09	31,495	630	7/5	2,264,050	67,922	7/16	578	29	7/12	2,917	58	[c]
1995	Jun 21–Jul 26	34,828	697	7/6	17,148	1,886	7/18	462	14	7/8	114	5	[c]
1996	Jun 20–Jul 25	27,556	827	6/30	946,677	28,400	7/10	588	47	7/6	458	14	[c]
1997	Jun 18–Jul 27	20,420	408	7/6	9,805	392	7/22	1,005	40	7/3	ND		NA
1998	Jun 18–Jul 27	18,963	474	7/7	693,660	27,746	7/22	330	17	7/9	ND		NA
1999	Jun 25–Jul 28	8,662	260	7/11	562	185	7/20	121	7	7/14	ND		NA
2000	Jun 22–Jul 27	13,764	551	7/5	803,801	64,304	7/10	147	6	7/7	ND		NA
2001	Jun 27–Sep 15	16,598	[d]	7/4	8,423	[d]	7/23	261	[d]	7/15	9,532	[d]	8/25
2002	Jun 17–Sep 11	37,995	[d]	7/6	1,114,410	[d]	7/10	778	[d]	7/5	6,459	[d]	8/23
2003	Jun 15–Sep 15	12,123	[d]	7/8	22,329	[d]	7/21	744	[d]	7/13	5,490	[d]	8/21
2004	Jun 16–Sep 14	10,362	[d]	6/30	3,054,684	[d]	7/10	663	[d]	7/6	11,240	[d]	8/25
2005	Jun 18–Sep 12	12,083	[d]	7/4	341,048	[d]	7/20	342	[d]	7/6	12,950	[d]	8/22
2006	Jun 22–Sep 12	39,519	[d]	7/6	1,347,090	[d]	7/11	195	[d]	7/10	22,341	[d]	8/19
2007	Jun 21–Sep 10	27,756	[d]	7/6	54,255	[d]	7/21	258	[d]	7/8	9,429	[d]	8/15
2008	Jun 23–Sep 07	9,483	394	7/4	1,444,228	60,502	7/7	237	29	7/7	10,462	431	8/18
2009	Jun 24–Sep 13	8,739	580	7/12	42,963	2,440	7/22	444	38	7/13	8,705	478	8/21
2010	Jun 25–Sep 08	71,403	9,322	7/5	634,169	86,381	7/10	138	26	7/8	8,058	984	8/13
2011	Jun 20–Sep 11	32,239	4,480	7/8	30,913	3,904	7/28	57	19	7/9	3,290	406	8/13
2012 [e]	Jun 23–Aug 16	5,577	364		393,030	21,073		60	18		781	63	
2013	Jun 23– Sep 11	5,625	636	7/13	13,212	790	7/24	15	6	–	3,729	261	8/14
2014	Jun 15–Sep 09	39,774	2,478	7/4	322,830	12,207	7/8	438	48	7/5	14,637	898	8/14

Note: En dash means the median passage not calculated 1965–1980 and for less than 20 fish in years after 1980.

[a] From 1965 to 1969 there are no standard errors because the entire run was not counted. Escapements should be considered minimum estimates

[b] From 1965 to 1984 Chinook salmon hourly counts were not expanded to account for passage of fish while not actively monitoring salmon passage (30 min/hour). From 1985 and after, counts were expanded to account for passage while salmon passage was not actively monitored.

[c] Median passage date for coho salmon not shown because entire run was not counted. Escapement should be considered a minimum estimate.

[d] Standard errors for 2001–2007 are in the process of being recovered.

[e] Median passage dates not shown because target operational period for project was not fully monitored. Escapements should be considered minimum estimates.

Table 13.–Salmon escapements, standard errors (SE), and median passage (Med. pass.) dates of Inglutalik River counting tower, Norton Sound, 2011–2014.

		Chum salmon			Pink salmon			Chinook salmon			Coho salmon		
Year	Operating period	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.
2011	Jun 24–Aug 12	62,897	3,434	7/12	475,167	26,650	7/27	1,469	134	7/5	862	82	[a]
2012	Jun 21–Aug 23	33,123	1,535	7/13	90,831	3,246	7/16	1,159	73	7/12	1,431	69	[a]
2013 [b]	Jun 21–Aug 11	51,099	4,253		201,438	23,619		3,411	719		4,488	958	
2014 [b]	Jun 20–Jul 12	62,153	3,391		61,752	3,710		1,676	105		978	[c]	

[a] Median passage date for coho salmon not shown because entire run was not counted. Escapement should be considered a minimum estimate.

[b] Median passage dates not shown because target operational period for project was not fully monitored. Escapements should be considered minimum estimates.

[c] Standard error was not calculated because hourly count data sheets were lost after July 9 when coho salmon started showing up.

Table 14.–Historical salmon escapements, standard errors (SE), and median passage (Med. pass.) dates at North River counting tower, Norton Sound, 1972-1974, 1984-1986, and 1996-2014.

		Chum salmon			Pink salmon			Chinook salmon			Coho salmon		
Year	Operating period	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.	Number	SE	Med. pass.
1972	Jul 07–Jul 28	2,332	[a]	–	54,934	[a]	–	561	[a]	–		[a]	–
1973	Jun 29–Jul 23	4,334	[a]	–	26,542	[a]	–	298	[a]	–		[a]	–
1974	Jun 25–Jul 17	826	[a]	–	143,789	[a]	–	196	[a]	–		[a]	–
				–			–			–			–
1984	Jun 25–Jul 28	2,915	[a]	–	458,387	[a]	–	2,844	[a]	–		[a]	–
1985	Jun 27–Aug 31	4,567	[a]	–	4,360	[a]	–	1,426	[a]	–	2,045	[a]	–
1986	Jun 25–Jul 18	3,738	[a]	–	236,487	[a]	–	1,613	[a]	–		[a]	–
1996	Jun 16–Jul 25	9,789	[a]	7/8	332,539	[a]	7/8	1,197	[a]	7/8	1,229	[a]	7/22
1997	Jun 16–Aug 21	6,904	[a]	7/19	127,926	[a]	7/21	4,185	[a]	7/1	5,768	[a]	8/12
1998	Jun 15–Aug 12	1,526	[a]	7/18	74,045	[a]	7/10	2,100	[a]	7/13	3,361	[a]	8/5
1999 [b]	Jun 30–Aug 31	5,600	[a]		48,993	[a]		1,639	[a]		4,792	[a]	
2000	Jun 17–Aug 12	4,971	[a]	7/11	69,703	[a]	7/4	1,046	[a]	7/8	6,961	[a]	8/5
2001 [b]	Jul 05–Sep 15	6,515	[a]		24,737	[a]		1,337	[a]		12,383	[a]	
2002	Jun 19–Aug 29	6,143	[a]	7/21	324,595	[a]	7/3	1,484	[a]	7/6	3,210	[a]	8/16
2003	Jun 15–Sep 13	9,859	[a]	7/26	280,212	[a]	7/19	1,452	[a]	7/12	5,837	[a]	8/10
2004	Jun 15–Sep 14	10,036	[a]	7/20	1,162,978	[a]	7/11	1,125	[a]	7/8	11,187	[a]	8/12
2005	Jun 15–Sep 15	11,984	[a]	7/16	1,670,934	[a]	7/15	1,015	[a]	7/6	19,189	[a]	8/17
2006	Jun 18–Sep 11	5,385	[a]	7/12	2,169,890	[a]	7/8	906	[a]	7/9	9,835	[a]	8/15
2007	Jun 16–Sep 05	8,046	[a]	7/25	583,320	[a]	7/22	1,948	[a]	7/12	19,944	[a]	8/6
2008	Jun 19–Sep 13	9,502	349	8/7	241,798	6,314	7/12	905	100	7/15	15,648	848	8/15
2009	Jun 19–Sep 11	9,795	413	7/22	190,289	6,741	7/21	2,357	185	7/13	22,274	923	8/21
2010	Jun 19–Sep 07	16,215	499	7/20	150,688	5,070	7/13	1,256	91	7/23	7,723	305	8/9
2011	Jun 23–Sep 08	21,396	3,124	7/15	138,542	4,195	7/26	841	104	7/12	4,975	229	8/21
2012 [b]	Jun 26–Aug 19	9,120	311		137,012	3,319		972	97		3,258	156	
2013	Jun 21–Sep 02	11,201	441	7/25	48,097	1,898	7/20	580	65	7/19	9,115	320	8/18
2014	Jun 14–Sep 01	13,872	1,010	7/15	246,075	1,010	7/12	3,454	403	7/11	4,995	281	8/15

Note: En dash means the median passage not calculated for 1972–1974 and 1984–1986.

[a] Standard errors prior to 2008 are in the process of being recovered.

[b] Median passage dates not shown because target operational period for project was not fully monitored. Escapements should be considered minimum estimates.

Table 15.–Historical salmon escapements, and median passage (Med. pass.) dates at the Unalakleet River weir, Norton Sound, 2010–2014.

		Chum salmon		Pink salmon		Chinook salmon		Coho salmon		Sockeye salmon	
Year	Operating period	Number	Med. pass.	Number	Med. pass.	Number	Med. pass.	Number	Med. pass.	Number	Med. pass.
2010	Jun 23–Jul 31	70,811	7/16	832,904	7/14	1,021	7/16	5,382	[a]	130	7/8
2011	Jun 17–Aug 07	104,050	7/16	354,361	7/28	1,030	7/18	10,231	[a]	181	7/15
2012	Jun 24–Aug 15	70,859	7/21	674,250	7/16	823	7/22	17,548	[a]	237	7/17
2013	Jun 20–Aug 22	106,715	7/17	143,250	7/23	667	7/11	25,550	[a]	217	7/18
2014 [b]	Jun 28–Aug 27	55,341		1,194,708		1,126		44,524		206	

[a] Median passage date for coho salmon not shown because entire run was not counted. Escapement should be considered a minimum estimate.

[b] Median passage dates not shown because target operational period for project was not fully monitored. Escapements should be considered minimum estimates.

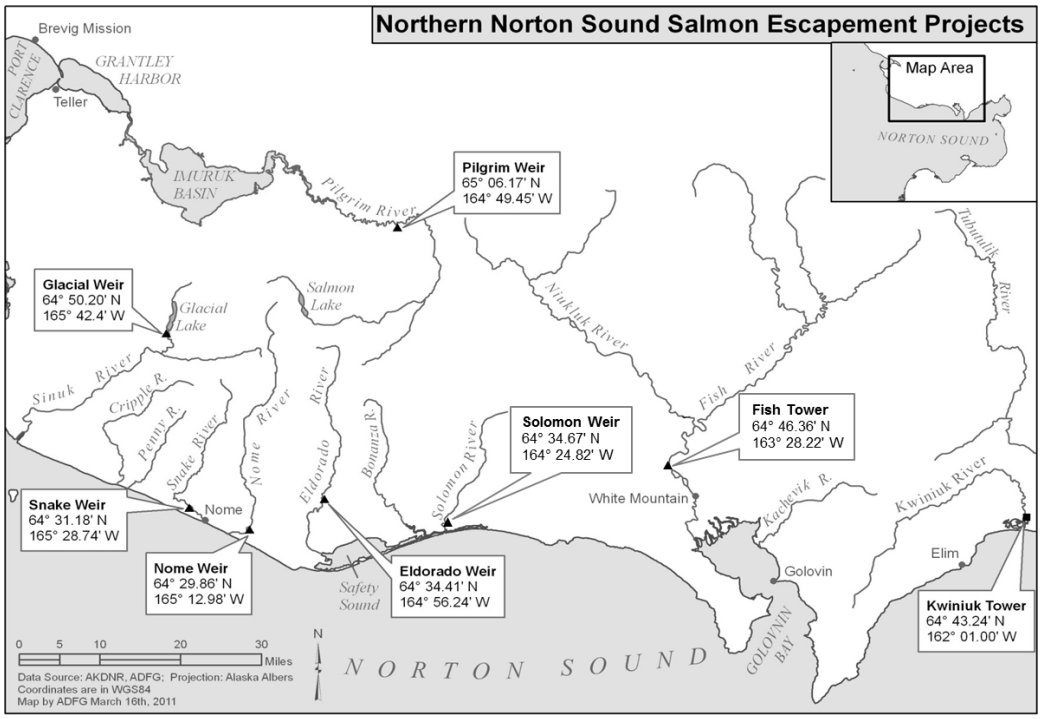

Figure 1.–Enumeration projects operating in northern Norton Sound–Port Clarence Area, 2013–2014.

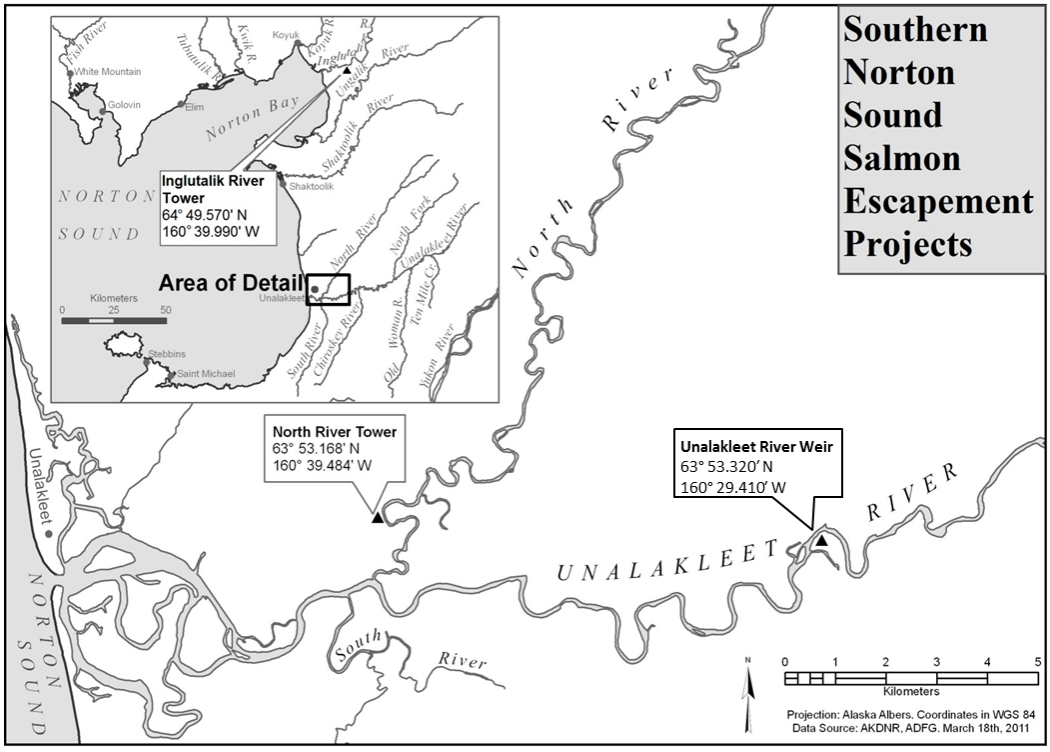

Figure 2.–Enumeration projects operating in southern Norton Sound Area, 2013–2014.

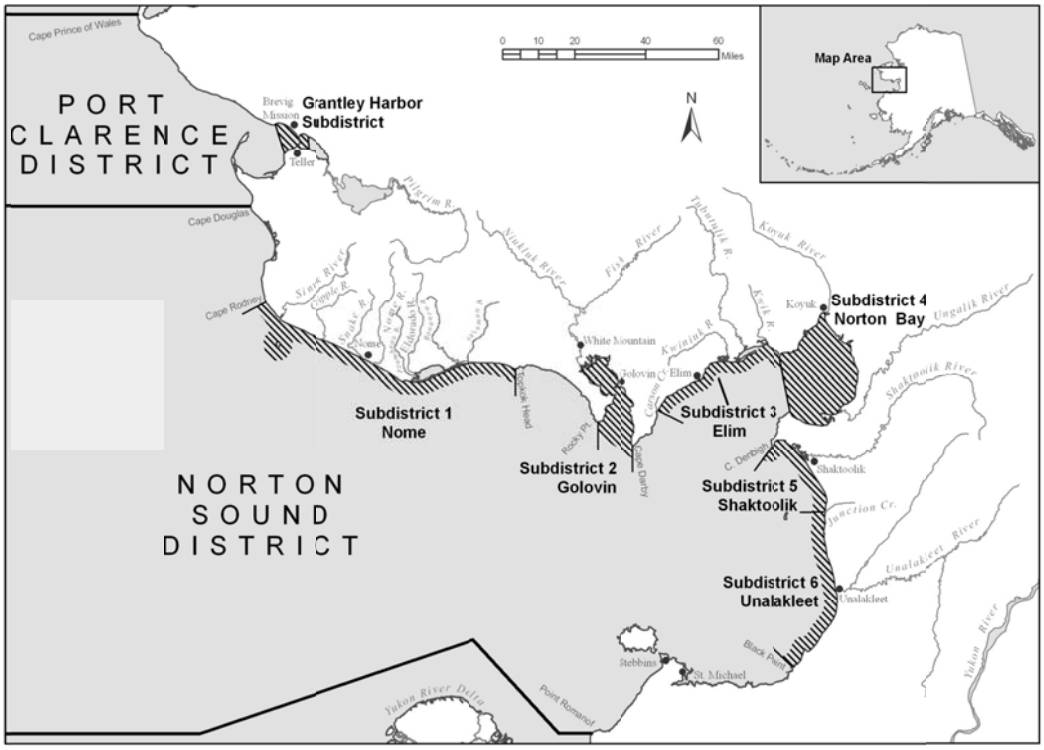

Figure 3.–Commercial salmon fishing districts and subdistricts and major salmon-producing drainages in the Norton Sound–Port Clarence Area.

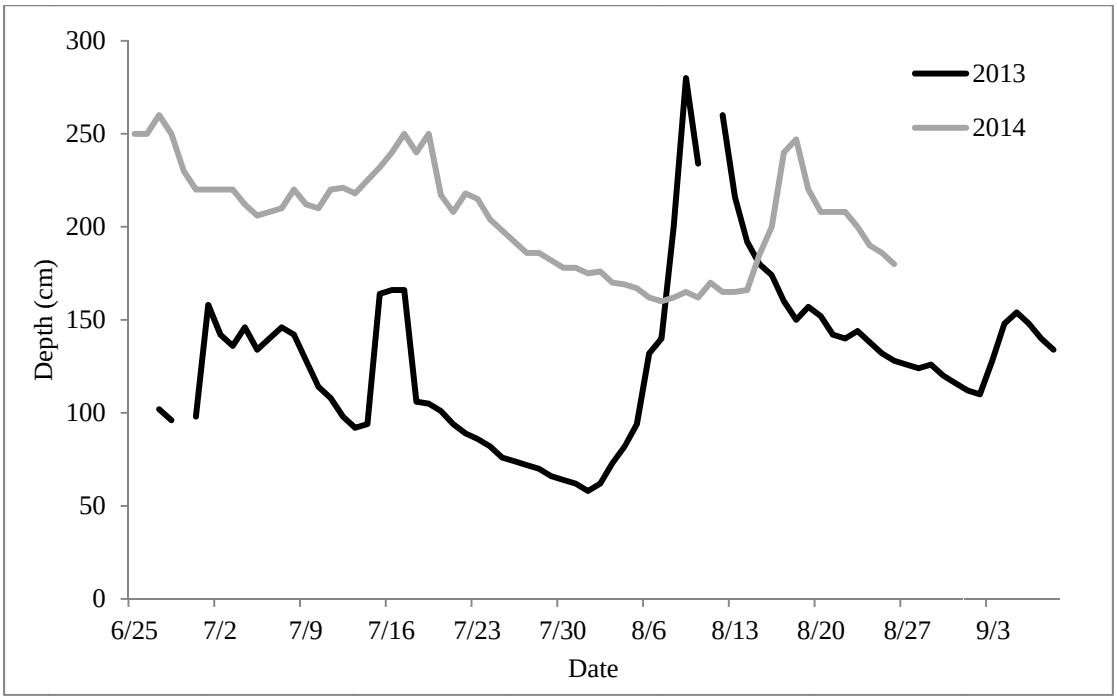

Figure 4.–Daily relative water level at Pilgrim River weir, 2013–2014.

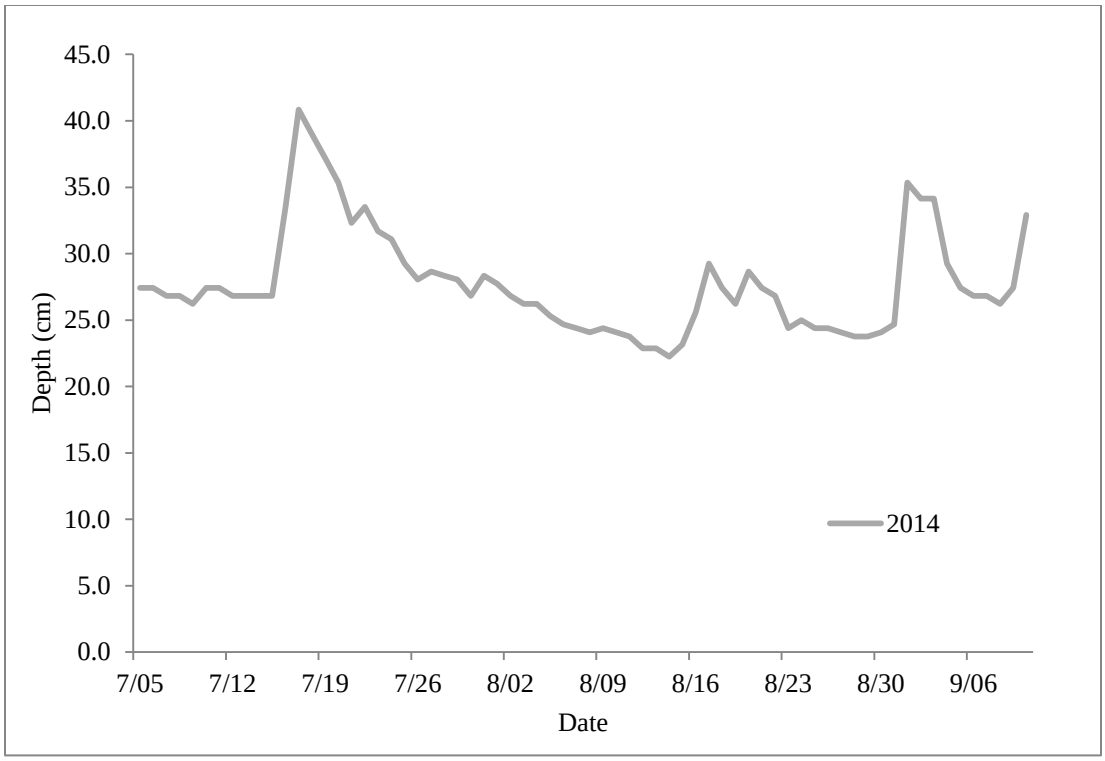

Figure 5.–Daily relative water level at Snake River weir, 2014.

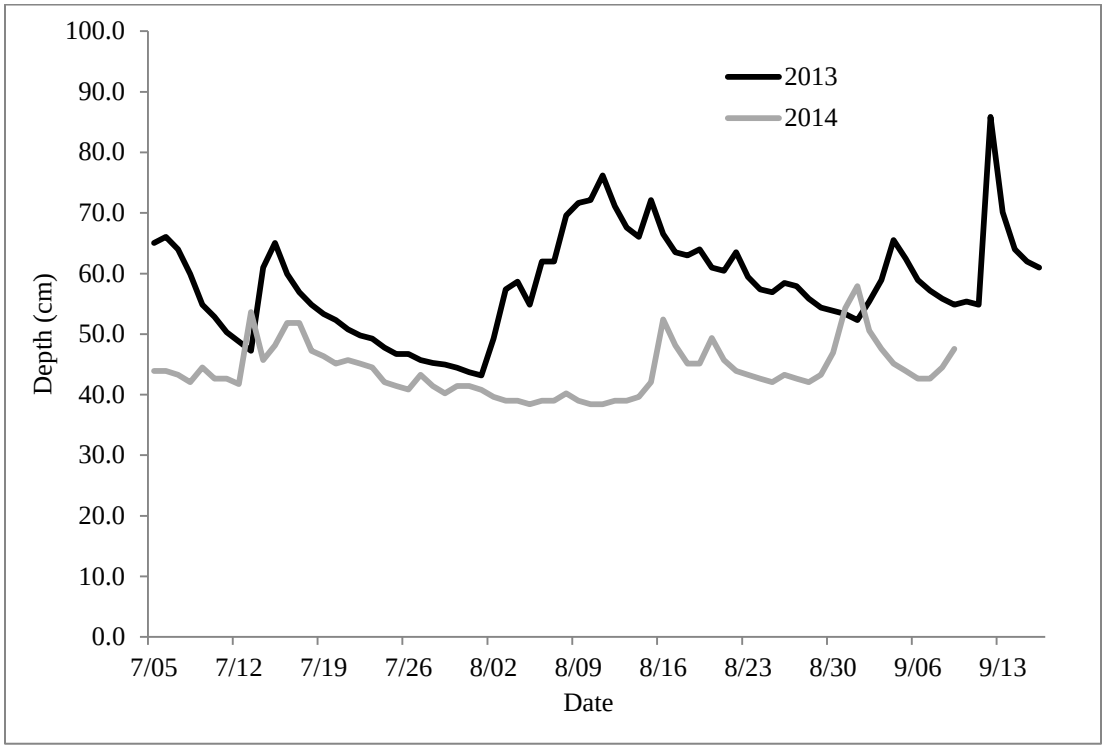

Figure 6.–Daily relative water level at Nome River weir, 2013–2014.

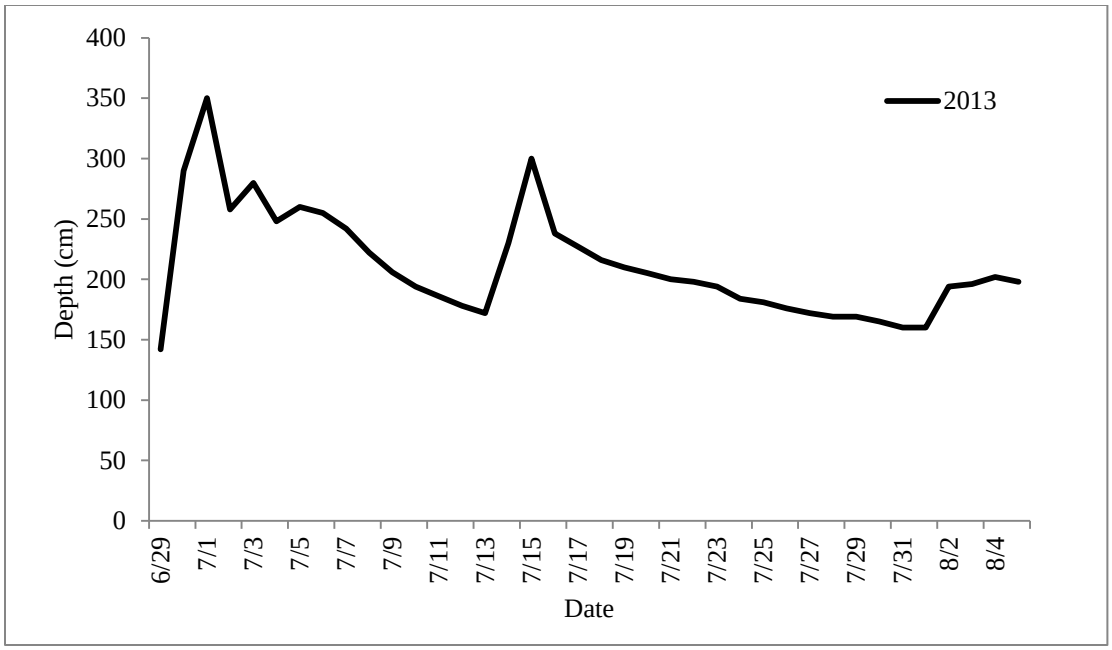

Figure 7.–Daily relative water level at Eldorado River weir, 2013.

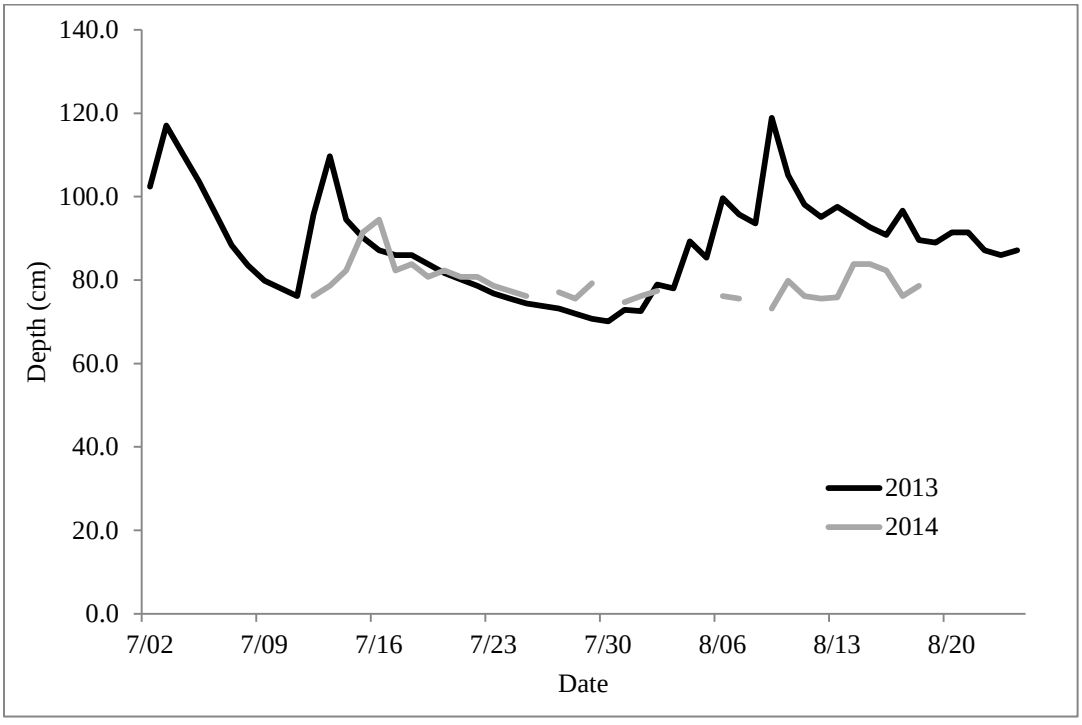

Figure 8.–Daily relative water level at Solomon River weir, 2013–2014.

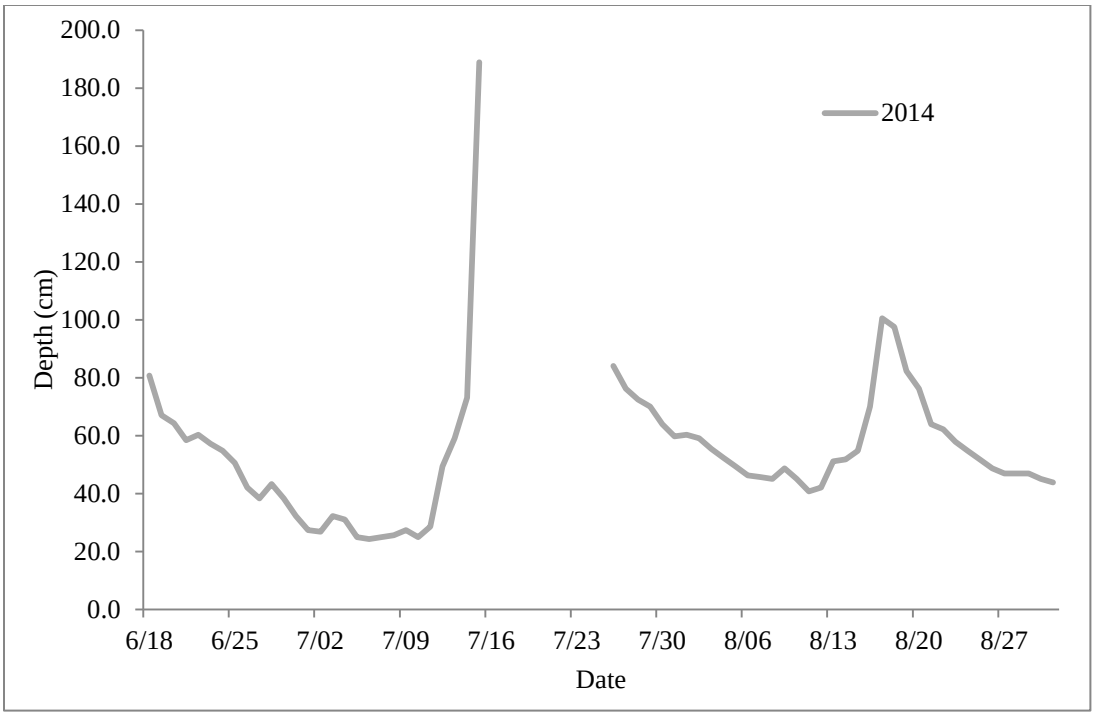

Figure 9.–Daily relative water level at Fish River counting tower, 2014.

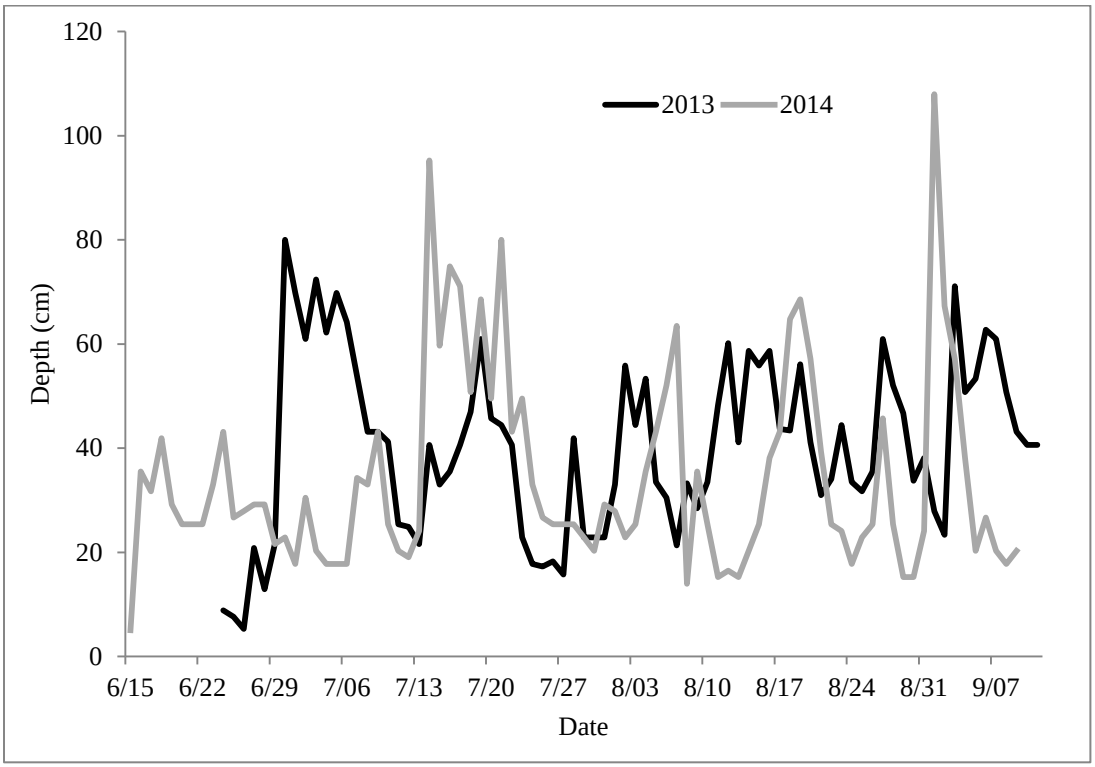

Figure 10.–Daily relative water level at Kwiniuk River tower, 2013–2014.

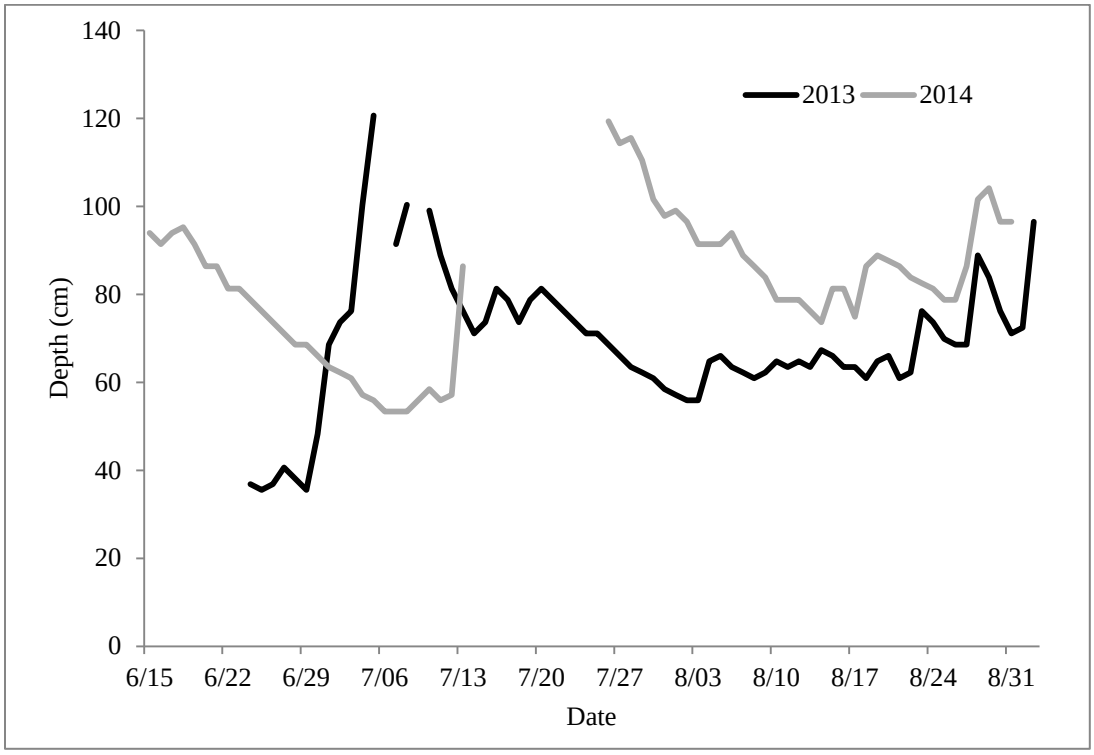

Figure 11.–Daily relative water level at North River tower, 2013–2014.

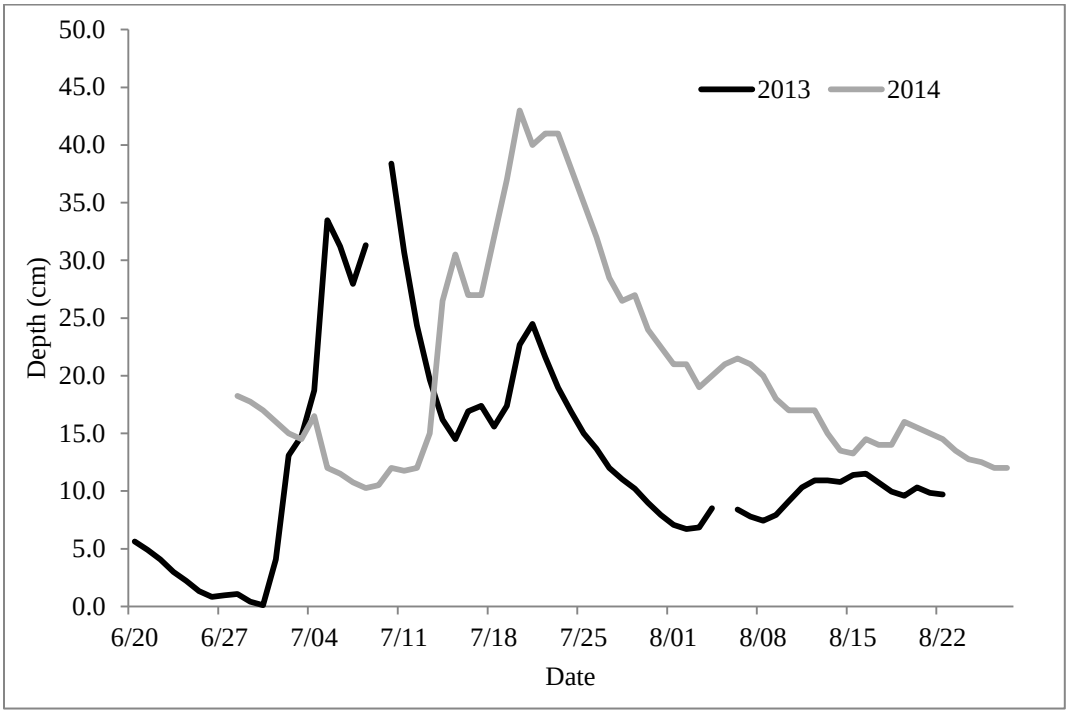

Figure 12.–Daily relative water level at Unalakleet River weir, 2013–2014.

APPENDIX A: PILGRIM RIVER WEIR

Appendix A1.–Daily and cumulative (Cum.) migration of all salmonid species past Pilgrim River weir, Port Clarence 2013.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
6/27	0	0	1	1	0	0	0	0	0	0
6/28	0	0	0	1	0	0	0	0	0	0
6/29	0	0	0	1	0	0	0	0	0	0
6/30	0	0	0	1	0	0	0	0	0	0
7/01	0	0	0	1	0	0	0	0	0	0
7/02	0	0	0	1	0	0	0	0	0	0
7/03	0	0	0	1	0	0	0	0	0	0
7/04	0	0	0	1	0	0	0	0	0	0
7/05	0	0	0	1	0	0	0	0	0	0
7/06	0	0	0	1	0	0	0	0	0	0
7/07	0	0	0	1	0	0	0	0	0	0
7/08	93	93	0	1	0	0	0	0	5	5
7/09	352	445	5	6	0	0	0	0	1,639	1,644
7/10	437	882	0	6	2	2	0	0	1,691	3,335
7/11	211	1,093	3	9	0	2	0	0	240	3,575
7/12	701	1,794	31	40	1	3	0	0	2,611	6,186
7/13	882	2,676	27	67	1	4	0	0	1,362	7,548
7/14	1,153	3,829	47	114	0	4	0	0	267	7,815
7/15	969	4,798	46	160	5	9	0	0	718	8,533
7/16	171	4,969	13	173	1	10	0	0	77	8,610
7/17	256	5,225	13	186	1	11	0	0	323	8,933
7/18	956	6,181	25	211	6	17	0	0	668	9,601
7/19	1,453	7,634	26	237	3	20	0	0	455	10,056
7/20	1,768	9,402	79	316	1	21	0	0	558	10,614
7/21	1,636	11,038	44	360	0	21	0	0	516	11,130
7/22	1,929	12,967	56	416	1	22	0	0	278	11,408
7/23	1,379	14,346	46	462	1	23	0	0	224	11,632
7/24	1,298	15,644	64	526	1	24	0	0	116	11,748
7/25	334	15,978	30	556	1	25	0	0	97	11,845
7/26	1,382	17,360	61	617	5	30	0	0	87	11,932
7/27	1,133	18,493	47	664	1	31	0	0	51	11,983
7/28	975	19,468	38	702	2	33	0	0	48	12,031
7/29	100	19,568	5	707	0	33	0	0	10	12,041
7/30	992	20,560	22	729	3	36	0	0	41	12,082
7/31	530	21,090	18	747	0	36	0	0	40	12,122
8/01	1,032	22,122	29	776	1	37	0	0	45	12,167
8/02	351	22,473	22	798	0	37	0	0	36	12,203
8/03	1,045	23,518	36	834	0	37	0	0	21	12,224
8/04	730	24,248	8	842	0	37	0	0	16	12,240
8/05	731	24,979	26	868	0	37	1	1	10	12,250
8/06	1,339	26,318	21	889	0	37	0	1	5	12,255
8/07	1,363	27,681	27	916	0	37	7	8	4	12,259
8/08	781	28,462	6	922	0	37	0	8	8	12,267
8/09	1,054	29,516	20	942	0	37	2	10	7	12,274
8/10	985	30,501	18	960	0	37	6	16	4	12,278
8/11	852	31,353	15	975	0	37	6	22	5	12,283
8/12	837	32,190	11	986	0	37	7	29	7	12,290
8/13	455	32,645	18	1,004	0	37	15	44	0	12,290
8/14	809	33,454	9	1,013	0	37	2	46	6	12,296

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Appendix A1.–Page 2 of 2.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/15	1,043	34,497	12	1,025	0	37	2	48	10	12,306
8/16	1,040	35,537	5	1,030	0	37	9	57	14	12,320
8/17	805	36,342	5	1,035	0	37	4	61	13	12,333
8/18	563	36,905	4	1,039	0	37	3	64	6	12,339
8/19	1,191	38,096	4	1,043	0	37	10	74	24	12,363
8/20	669	38,765	5	1,048	0	37	6	80	11	12,374
8/21	773	39,538	4	1,052	0	37	3	83	5	12,379
8/22	655	40,193	1	1,053	0	37	6	89	6	12,385
8/23	879	41,072	2	1,055	0	37	13	102	6	12,391
8/24	259	41,331	1	1,056	0	37	0	102	5	12,396
8/25	525	41,856	0	1,056	0	37	4	106	6	12,402
8/26	591	42,447	0	1,056	0	37	26	132	7	12,409
8/27	525	42,972	0	1,056	0	37	65	197	4	12,413
8/28	405	43,377	0	1,056	0	37	15	212	4	12,417
8/29	469	43,846	1	1,057	0	37	25	237	3	12,420
8/30	657	44,503	0	1,057	0	37	25	262	2	12,422
8/31	614	45,117	0	1,057	0	37	71	333	2	12,424
9/01	449	45,566	0	1,057	0	37	20	353	0	12,424
9/02	261	45,827	0	1,057	0	37	19	372	0	12,424
9/03	596	46,423	0	1,057	0	37	327	699	3	12,427
9/04	588	47,011	0	1,057	0	37	167	866	0	12,427
9/05	233	47,244	0	1,057	0	37	15	881	0	12,427
9/06	140	47,384	2	1,059	0	37	5	886	1	12,428
9/07	115	47,499	0	1,059	0	37	3	889	0	12,428
9/08	58	47,557	1	1,060	0	37	1	890	0	12,428
Total	47,557		1,060		37		890		12,428	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix A2.–Daily and cumulative (Cum.) migration of all salmonid species past Pilgrim River weir, Port Clarence, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
6/25	0	0	0	0	0	0	0	0	0	0
6/26	0	0	0	0	0	0	0	0	0	0
6/27	0	0	0	0	0	0	0	0	1	1
6/28	0	0	0	0	0	0	0	0	0	1
6/29	0	0	1	1	0	0	0	0	0	1
6/30	1	1	0	1	0	0	0	0	0	1
7/01	3	4	1	2	0	0	0	0	1	2
7/02	4	8	1	3	0	0	0	0	30	32
7/03	13	21	3	6	0	0	0	0	53	85
7/04	34	55	5	11	0	1	0	0	50	135
7/05	143	198	30	41	0	2	0	0	204	339
7/06	210	408	87	128	0	2	0	0	283	622
7/07	421	829	143	271	0	1	0	0	692	1,314
7/08	382	1,211	257	528	0	1	0	0	416	1,730
7/09	55	1,266	75	603	0	1	0	0	75	1,805
7/10	264	1,530	295	898	0	0	0	0	401	2,206
7/11	493	2,023	250	1,148	1	3	0	0	206	2,412
7/12	335	2,358	408	1,556	2	2	0	0	179	2,591
7/13	412	2,770	256	1,812	4	6	0	0	117	2,708
7/14	720	3,490	354	2,166	1	12	0	0	601	3,309
7/15	121	3,611	35	2,201	0	1	0	0	88	3,397
7/16	166	3,777	58	2,259	1	0	0	0	53	3,450
7/17	341	4,118	58	2,317	6	1	0	0	24	3,474
7/18	570	4,688	173	2,490	1	3	0	0	62	3,536
7/19	262	4,950	111	2,601	3	2	0	0	53	3,589
7/20	80	5,030	41	2,642	0	0	0	0	39	3,628
7/21	338	5,368	124	2,766	2	0	0	0	71	3,699
7/22	1,022	6,390	407	3,173	0	2	0	0	876	4,575
7/23	953	7,343	176	3,349	0	2	0	0	410	4,985
7/24	231	7,574	14	3,363	2	0	0	0	54	5,039
7/25	335	7,909	75	3,438	2	0	0	0	381	5,420
7/26	513	8,422	94	3,532	0	0	0	0	577	5,997
7/27	75	8,497	39	3,571	1	0	0	0	20	6,017
7/28	200	8,697	46	3,617	3	1	1	1	388	6,405
7/29	481	9,178	105	3,722	7	0	0	1	355	6,760
7/30	957	10,135	116	3,838	0	0	5	6	409	7,169
7/31	296	10,431	73	3,911	1	0	2	8	299	7,468
8/01	1,115	11,546	109	4,020	0	0	4	12	586	8,054
8/02	1,488	13,034	65	4,085	3	0	3	15	513	8,567
8/03	940	13,974	40	4,125	1	1	3	18	208	8,775
8/04	971	14,945	13	4,138	0	0	4	22	137	8,912
8/05	1,228	16,173	13	4,151	1	0	10	32	126	9,038
8/06	868	17,041	24	4,175	2	0	13	45	97	9,135
8/07	1,177	18,218	11	4,186	0	0	10	55	100	9,235
8/08	718	18,936	2	4,188	0	0	2	57	65	9,300
8/09	521	19,457	1	4,189	0	2	1	58	120	9,420
8/10	652	20,109	1	4,190	0	0	16	74	58	9,478
8/11	689	20,798	0	4,190	0	0	25	99	66	9,544
8/12	651	21,449	1	4,191	0	0	6	105	37	9,581

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/13	397	21,846	3	4,194	0	46	25	130	33	9,614
8/14	556	22,402	0	4,194	0	46	20	150	15	9,629
8/15	799	23,201	2	4,196	1	47	27	177	24	9,653
8/16	424	23,625	0	4,196	1	48	46	223	16	9,669
8/17	224	23,849	0	4,196	0	48	12	235	1	9,670
8/18	168	24,017	0	4,196	0	48	24	259	0	9,670
8/19	106	24,123	1	4,197	0	48	3	262	32	9,702
8/20	135	24,258	0	4,197	0	48	13	275	6	9,708
8/21	353	24,611	0	4,197	0	48	22	297	3	9,711
8/22	212	24,823	0	4,197	0	48	21	318	3	9,714
8/23	289	25,112	0	4,197	0	48	24	342	1	9,715
8/24	247	25,359	0	4,197	0	48	18	360	2	9,717
8/25	195	25,554	0	4,197	0	48	22	382	1	9,718
8/26	80	25,634	0	4,197	0	48	43	425	1	9,719
Total	25,634		4,197		48		425		9,719	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix A3.–Age and sex compositions by year for Pilgrim River chum salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples	Percent by Sex		Percent by (Age Group)						
			Male	Female	(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)
2001	No data collected.										
2002	7/20-8/06	471	59.0	41.0	0.0	0.2	80.5	14.0	5.3	0.0	0.0
2003	7/03-7/30	235	54.5	45.5	0.0	0.0	50.6	47.7	1.7	0.0	0.0
2004	6/26-9/14	381	52.2	47.8	0.0	6.8	37.5	54.9	0.8	0.0	0.0
2005	6/29-9/04	528	52.1	47.9	0.0	0.6	83.9	14.4	1.1	0.0	0.0
2006	7/08-9/08	611	46.5	53.5	0.0	2.1	50.7	47.0	0.2	0.0	0.0
2007	7/03-9/06	506	50.2	49.8	0.0	0.6	45.0	48.7	5.7	0.0	0.0
2008	7/06-8/28	486	68.3	31.7	0.0	0.0	7.6	82.5	9.5	0.4	0.0
2009	7/02-8/20	424	58.7	41.3	0.0	14.2	30.9	30.2	23.8	0.9	0.0
2010	7/08-8/27	215	62.3	37.7	0.0	0.9	87.9	11.2	0.0	0.0	0.0
2011	7/15-9/05	185	48.2	51.8	0.0	0.0	31.4	68.6	0.0	0.0	0.0
2012	7/08-8/16	155	56.1	43.9	0.0	0.6	54.4	38.3	6.7	0.0	0.0
2013	7/15-8/25	194	58.2	41.8	0.0	0.9	44.5	54.5	0.0	0.0	0.0
2014	7/04-8/05	178	54.1	45.9	0.0	0.0	33.9	57.3	8.7	0.0	0.0

Appendix A4.–Age and sex compositions by year for Pilgrim River Chinook salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)						
				Male	Female	(1.1)	(1.2)	(1.3)	(1.4)	(2.3)	(1.5)	(2.4)
2001				No data collected								
2002	7/20	4	[a,b]									
2003	7/05-7/31	10	[b]									
2004				No data collected								
2005	7/07-8/26	12	[b]									
2006	7/11-9/02	43	[b]									
2007				No data collected								
2008	7/27-8/12	2	[b]									
2009	7/12-8/27	37	[b]									
2010	7/20-8/31	9	[b]									
2011				No data collected								
2012				No data collected								
2013				No data collected								
2014				No data collected								

[a] No age data collected.

[b] Sample size insufficient for sex composition analysis.

Appendix A5.–Age and sex compositions by year for Pilgrim River coho salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)				
				Male	Female	(1.1)	(2.1)	(2.2)	(3.1)	(4.1)
2001				No data collected						
2002				No data collected						
2003	8/29-9/07	23	[a]							
2004	8/07-9/14	143		54.5	45.5	7.7	89.5	0.0	2.8	0.0
2005	8/05-9/04	90	[a]	56.7	43.3					
2006	7/22-9/08	217		58.1	41.9	21.7	77.0	0.0	1.4	0.0
2007	8/09-9/09	57	[a]							
2008	8/11-9/01	86	[a]	59.3	40.7					
2009				No data collected						
2010				No data collected						
2011				No data collected						
2012				No data collected						
2013				No data collected						
2014				No data collected						

[a] Sample size insufficient for sex composition analysis.

Appendix A6.–Age and sex compositions by year for Pilgrim River sockeye salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)											
				Male	Female	(0.2)	(0.3)	(1.2)	(2.1)	(1.3)	(2.2)	(3.1)	(1.4)	(2.3)	(3.2)	(2.4)	(3.3)
2001	8/10-9/13	278	[a]	42.4	57.6	0.0	0.0	0.4	0.0	15.8	1.8	0.0	0.0	81.7	0.0	0.4	0.0
2002	7/20-8/13	198	[a]	42.4	57.6	0.0	0.0	1.0	0.0	2.0	74.2	0.5	0.0	18.2	3.0	1.0	0.0
2003	7/01-8/29	248		39.1	60.9	0.0	0.0	3.6	0.0	5.2	61.3	0.0	0.0	29.4	0.0	0.4	0.0
2004	6/25-9/14	605		38.7	61.3	0.0	0.2	5.6	0.2	15.7	43.6	0.0	0.5	34.0	0.0	0.3	0.0
2005	6/29-7/02	705		43.7	56.3	0.0	0.1	6.0	0.0	13.3	44.8	0.0	0.0	35.3	0.0	0.4	0.0
2006	7/08-9/05	706		49.2	50.8	0.1	0.0	14.5	0.0	28.8	10.6	0.0	0.0	45.8	0.0	0.1	0.0
2007	7/03-9/03	428		48.6	51.4	0.0	0.0	4.2	0.0	73.1	4.4	0.0	0.0	18.0	0.0	0.2	0.0
2008	7/06-8/22	332		55.4	44.6	0.0	0.0	0.0	0.0	48.2	0.9	0.0	0.6	50.0	0.0	0.3	0.0
2009	7/06-8/10	159		66.7	33.3	0.0	0.0	0.6	0.0	18.2	0.6	0.0	47.8	13.8	0.0	18.9	0.0
2010	7/04-8/09	405		44.0	56.0	0.0	0.0	5.9	0.2	3.2	6.7	0.0	0.0	82.5	0.0	1.5	0.0
2011	7/03-8/08	221		39.8	60.2	0.0	0.0	1.8	0.0	92.8	0.0	0.0	0.5	5.0	0.0	0.0	0.0
2012	7/08-8/07	231		34.9	65.1	0.0	0.0	4.1	0.0	15.4	26.1	0.0	12.0	37.8	0.0	4.6	0.0
2013	7/08-8/19	229		50.6	49.4	0.0	0.0	1.3	0.0	21.8	19.7	0.0	0.4	54.4	0.4	0.8	1.3
2014	7/03-8/03	270		[b]	[b]	0.0	0.0	41.1	0.0	11.1	10.7	0.0	0.0	34.1	0.0	1.9	1.1

[a] Age, sex, and length data collected near outlet of Salmon Lake.

[b] A large number of scales had no gender associated with them so sex composition could not be determined.

Appendix A7.–Pilgrim River weir water temperature (Temp.) and stream stage (Depth) observations, Port Clarence 2013–2014.

	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
6/25			ND	250
6/26			10.0	250
6/27	11.0	102	11.0	260
6/28	9.0	96	11.0	250
6/29	ND	ND	10.0	230
6/30	9.0	98	10.0	220
7/01	10.0	158	10.0	220
7/02	10.0	142	9.0	220
7/03	10.0	136	9.0	220
7/04	8.0	146	10.0	212
7/05	8.0	134	10.0	206
7/06	ND	140	11.0	208
7/07	10.0	146	13.0	210
7/08	8.0	142	13.0	220
7/09	11.0	128	13.0	212
7/10	10.0	114	11.0	210
7/11	11.0	108	13.0	220
7/12	12.0	98	11.0	221
7/13	12.0	92	12.0	218
7/14	16.0	94	10.0	225
7/15	12.0	164	9.0	232
7/16	12.0	166	9.0	240
7/17	12.0	166	10.0	250
7/18	8.0	106	7.0	240
7/19	12.0	105	9.0	250
7/20	11.0	101	7.0	217
7/21	10.0	94	8.0	208
7/22	10.0	89	7.0	218
7/23	12.0	86	10.0	215
7/24	18.0	82	8.0	204
7/25	11.0	76	8.0	198
7/26	13.0	74	9.0	192
7/27	14.0	72	10.0	186
7/28	15.0	70	9.0	186
7/29	13.0	66	10.0	182
7/30	13.0	64	10.0	178
7/31	13.0	62	11.0	178

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	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
8/01	14.0	58	12.0	175
8/02	15.0	62	12.0	176
8/03	13.0	73	13.0	170
8/04	14.0	82	12.0	169
8/05	12.0	94	13.0	167
8/06	12.0	132	13.0	162
8/07	12.0	140	13.0	160
8/08	12.0	200	13.0	162
8/09	12.0	280	13.0	165
8/10	12.0	234	12.0	162
8/11	ND	ND	13.0	170
8/12	11.5	260	13.0	165
8/13	10.0	216	12.0	165
8/14	11.0	192	12.0	166
8/15	11.0	180	12.0	185
8/16	12.0	174	13.0	200
8/17	10.0	160	12.0	240
8/18	10.0	150	12.0	247
8/19	11.0	157	12.0	220
8/20	10.0	152	11.0	208
8/21	10.0	142	10.0	208
8/22	10.0	140	10.0	208
8/23	10.0	144	10.0	200
8/24	9.0	138	11.0	190
8/25	9.0	132	ND	186
8/26	10.0	128	ND	180
8/27	9.0	126		
8/28	9.0	124		
8/29	7.0	126		
8/30	7.0	120		
8/31	7.0	116		
9/01	7.0	112		
9/02	7.0	110		
9/03	7.0	128		
9/04	9.0	148		
9/05	8.0	154		
9/06	8.0	148		
9/07	8.0	140		
9/08	6.0	134		

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.

APPENDIX B: GLACIAL LAKE WEIR

Appendix B1.–Daily and cumulative (Cum.) sockeye salmon migration past Glacial Lake weir, Norton Sound, 2013.

Date	Daily Sockeye	Cum. Sockeye
6/30	0	0
7/01	0	0
7/02	0	0
7/03	14	14
7/04	186	200
7/05	216	416
7/06	14	430
7/07	219	649
7/08	103	752
7/09	170	922
7/10	228	1,150
7/11	69	1,219
7/12	539	1,758
7/13	129	1,887
7/14	210	2,097
7/15	112	2,209
7/16	29	2,238
7/17	8	2,246
7/18	5	2,251
7/19	0	2,251
7/20	10	2,261
7/21	36	2,297
7/22	13	2,310
7/23	22	2,332
7/24	20	2,352
7/25	37	2,389
7/26	13	2,402
7/27	0	2,402
7/28	0	2,402
7/29	0	2,402
7/30	0	2,402
7/31	0	2,402
8/01	0	2,402
8/02	0	2,402
8/03	93	2,495
8/04	0	2,495
8/05	0	2,495
8/06	12	2,507
8/07	3	2,510
8/08	6	2,516
8/09	18	2,534
8/10	4	2,538
8/11	3	2,541
8/12	3	2,544
Total	2,544	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix B2.–Daily and cumulative (Cum.) sockeye salmon migration past Glacial Lake weir, Norton Sound, 2014.

Date	Daily Sockeye	Cum. Sockeye
6/30	74	74
7/01	175	249
7/02	495	744
7/03	342	1,086
7/04	124	1,210
7/05	239	1,449
7/06	673	2,122
7/07	717	2,839
7/08	495	3,334
7/09	143	3,477
7/10	130	3,607
7/11	134	3,741
7/12	68	3,809
7/13	51	3,860
7/14	110	3,970
7/15	40	4,010
7/16	40	4,050
7/17	55	4,105
7/18	21	4,126
7/19	18	4,144
7/20	13	4,157
7/21	4	4,161
7/22	6	4,167
7/23	7	4,174
7/24	10	4,184
7/25	9	4,193
7/26	2	4,195
7/27	9	4,204
7/28	4	4,208
7/29	0	4,208
7/30	0	4,208
7/31	1	4,209
8/01	1	4,210
8/02	1	4,211
8/03	0	4,211
8/04	0	4,211
8/05	0	4,211
8/06	0	4,211
8/07	0	4,211
Total	4,211	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix B3.–Age and sex compositions by year for Glacial Lake sockeye salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples	Percent by Sex		Percent by (Age Group)											
			Male	Female	(0.2)	(0.3)	(1.2)	(2.1)	(1.3)	(2.2)	(3.1)	(1.4)	(2.3)	(3.2)	(2.4)	(3.3)
2001						No data collected										
2002						No data collected										
2003						No data collected										
2004						No data collected										
2005						No data collected										
2006	7/05-7/15	248	52.8	47.2	0.0	0.0	0.0	0.0	0.0	20.6	0.0	0.0	79.0	0.0	0.4	0.0
2007	7/06-7/21	122	44.3	55.7												
2008	7/02-7/28	152	36.8	63.2	0.0	0.0	1.3	0.0	2.6	8.6	0.0	0.7	82.2	0.0	4.6	0.0
2009	7/02-7/27	40 [a]														
2010	7/10-7/12	40 [a]														
2011						No data collected										
2012						No data collected										
2013						No data collected										
2014						No data collected										

[a] Sample size insufficient for sex composition analysis.

Appendix B4.–Glacial Lake video weir water temperature (Temp.) observations, 2013–2014.

Date	2013 Temp. (°C)	2014 Temp. (°C)
6/30	ND	5.3
7/01	ND	12.8
7/02	8.6	11.2
7/03	8.8	10.2
7/04	8.0	10.0
7/05	7.9	10.7
7/06	7.5	12.9
7/07	9.0	14.5
7/08	10.0	15.9
7/09	12.1	16.7
7/10	13.3	15.9
7/11	13.1	15.7
7/12	13.4	14.4
7/13	14.3	15.4
7/14	16.1	14.0
7/15	13.8	12.1
7/16	13.4	11.1
7/17	11.9	10.9
7/18	10.5	9.1
7/19	12.0	11.0
7/20	11.4	10.3
7/21	11.0	10.1
7/22	10.9	9.1
7/23	11.3	10.7
7/24	13.1	9.7
7/25	14.1	9.6
7/26	14.5	10.6
7/27	15.2	11.9
7/28	15.8	11.2
7/29	14.4	12.7
7/30	14.0	14.2
7/31	14.6	14.1
8/01	15.8	14.1
8/02	17.2	15.2
8/03	16.2	16.9
8/04	15.5	17.0
8/05	14.1	17.7
8/06	13.5	18.7
8/07	13.8	18.7
8/08	14.4	
8/09	13.9	
8/10	13.4	
8/11	13.5	
8/12	13.0	

Note: Recorded water temperatures are morning water temperatures measured with a HOBO Water Temp Pro v2 logger.

APPENDIX C: SNAKE RIVER WEIR

Appendix C1.–Daily and cumulative (Cum.) passage of all salmonid species at Snake River weir, Norton Sound, 2013.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
7/09	0	0	0	0	0	0	0	0	0	0
7/10	0	0	0	0	0	0	0	0	0	0
7/11	0	0	0	0	0	0	0	0	0	0
7/12	107	107	2	2	0	0	0	0	0	0
7/13	673	780	195	197	0	0	0	0	0	0
7/14	18	798	4	201	0	0	0	0	0	0
7/15	79	877	3	204	0	0	0	0	0	0
7/16	20	897	1	205	0	0	0	0	0	0
7/17	4	901	3	208	0	0	0	0	0	0
7/18	151	1,052	29	237	0	0	0	0	0	0
7/19	122	1,174	22	259	0	0	0	0	0	0
7/20	149	1,323	7	266	0	0	0	0	0	0
7/21	311	1,634	81	347	3	3	0	0	0	0
7/22	25	1,659	10	357	1	4	0	0	0	0
7/23	109	1,768	25	382	0	4	1	1	0	0
7/24	58	1,826	16	398	0	4	0	1	0	0
7/25	40	1,866	28	426	0	4	1	2	0	0
7/26	95	1,961	41	467	0	4	0	2	0	0
7/27	72	2,033	68	535	0	4	0	2	0	0
7/28	0	2,033	0	535	0	4	0	2	0	0
7/29	0	2,033	0	535	0	4	0	2	0	0
7/30	12	2,045	17	552	0	4	1	3	0	0
7/31	41	2,086	32	584	0	4	0	3	0	0
8/01	122	2,208	99	683	0	4	0	3	0	0
8/02	114	2,322	131	814	0	4	2	5	0	0
8/03	82	2,404	72	886	0	4	0	5	0	0
8/04	28	2,432	36	922	0	4	2	7	0	0
8/05	17	2,449	21	943	0	4	0	7	0	0
8/06	54	2,503	42	985	0	4	4	11	0	0
8/07	16	2,519	34	1,019	0	4	3	14	0	0
8/08	16	2,535	34	1,053	0	4	3	17	0	0
8/09	23	2,558	26	1,079	0	4	17	34	0	0
8/10	17	2,575	15	1,094	0	4	2	36	0	0
8/11	19	2,594	35	1,129	0	4	15	51	0	0
8/12	12	2,606	37	1,166	0	4	31	82	0	0
8/13	7	2,613	11	1,177	0	4	8	90	0	0
8/14	7	2,620	16	1,193	0	4	7	97	0	0
8/15	16	2,636	18	1,211	0	4	78	175	0	0
8/16	6	2,642	22	1,233	0	4	24	199	0	0
8/17	5	2,647	4	1,237	0	4	66	265	0	0
8/18	5	2,652	10	1,247	0	4	3	268	0	0
8/19	1	2,653	7	1,254	1	5	40	308	0	0
8/20	4	2,657	4	1,258	0	5	11	319	0	0
8/21	5	2,662	5	1,263	0	5	6	325	0	0
8/22	4	2,666	7	1,270	2	7	34	359	0	0
8/23	4	2,670	6	1,276	0	7	91	450	0	0
8/24	1	2,671	2	1,278	0	7	2	452	0	0
8/25	5	2,676	7	1,285	1	8	100	552	0	0
8/26	8	2,684	2	1,287	0	8	29	581	2	2

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/27	4	2,688	6	1,293	0	8	38	619	5	7
8/28	4	2,692	4	1,297	0	8	13	632	1	8
8/29	3	2,695	6	1,303	0	8	22	654	3	11
8/30	1	2,696	1	1,304	0	8	5	659	0	11
8/31	9	2,705	5	1,309	0	8	50	709	6	17
9/01	1	2,706	5	1,314	0	8	15	724	0	17
9/02	4	2,710	1	1,315	0	8	110	834	0	17
9/03	27	2,737	6	1,321	0	8	65	899	115	132
9/04	7	2,744	3	1,324	0	8	138	1,037	28	160
9/05	2	2,746	2	1,326	0	8	105	1,142	3	163
9/06	2	2,748	3	1,329	0	8	28	1,170	0	163
9/07	4	2,752	3	1,332	0	8	23	1,193	0	163
9/08	0	2,752	0	1,332	0	8	3	1,196	0	163
9/09	1	2,753	0	1,332	0	8	7	1,203	0	163
9/10	2	2,755	1	1,333	0	8	0	1,203	0	163
Total	2,755		1,333		8		1,203		163	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix C2.–Daily and cumulative (Cum.) passage of all salmonid species at Snake River weir, Norton Sound, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
7/5	42	42	34	34	0	0	0	0	0	0
7/6	196	238	262	296	0	0	0	0	0	0
7/7	58	296	89	385	0	0	0	0	0	0
7/8	4	300	15	400	0	0	0	0	0	0
7/9	3	303	2	402	0	0	0	0	0	0
7/10	8	311	5	407	0	0	0	0	0	0
7/11	431	742	546	953	0	0	0	0	0	0
7/12	567	1,309	1,226	2,179	0	0	0	0	0	0
7/13	68	1,377	465	2,644	0	0	0	0	0	0
7/14	16	1,393	40	2,684	0	0	0	0	0	0
7/15	18	1,411	256	2,940	0	0	0	0	0	0
7/16	433	1,844	983	3,923	0	0	0	0	0	0
7/17	430	2,274	1,235	5,158	0	0	0	0	0	0
7/18	37	2,311	681	5,839	0	0	0	0	0	0
7/19	215	2,526	1,253	7,092	0	0	0	0	0	0
7/20	227	2,753	1,412	8,504	0	0	0	0	1	1
7/21	4	2,757	270	8,774	0	0	0	0	1	2
7/22	36	2,793	516	9,290	0	0	0	0	2	4
7/23	33	2,826	621	9,911	3	3	0	0	1	5
7/24	153	2,979	760	10,671	0	3	0	0	2	7
7/25	0	2,979	0	10,671	0	3	0	0	0	7
7/26	17	2,996	330	11,001	0	3	0	0	0	7
7/27	8	3,004	194	11,195	0	3	0	0	0	7
7/28	148	3,152	1,093	12,288	0	3	0	0	1	8
7/29	65	3,217	250	12,538	0	3	0	0	1	9
7/30	12	3,229	108	12,646	0	3	0	0	0	9
7/31	38	3,267	1,151	13,797	2	5	1	1	2	11
8/1	76	3,343	1,396	15,193	0	5	3	4	2	13
8/2	73	3,416	1,063	16,256	1	6	5	9	2	15
8/3	131	3,547	792	17,048	2	8	11	20	0	15
8/4	20	3,567	180	17,228	0	8	0	20	1	16
8/5	46	3,613	187	17,415	0	8	5	25	3	19
8/6	35	3,648	156	17,571	0	8	1	26	5	24
8/7	32	3,680	190	17,761	0	8	2	28	3	27
8/8	46	3,726	191	17,952	0	8	2	30	3	30
8/9	57	3,783	652	18,604	0	8	6	36	10	40
8/10	28	3,811	290	18,894	0	8	14	50	6	46
8/11	30	3,841	148	19,042	0	8	8	58	2	48
8/12	16	3,857	120	19,162	0	8	12	70	4	52
8/13	7	3,864	50	19,212	0	8	8	78	5	57
8/14	4	3,868	23	19,235	0	8	4	82	0	57
8/15	8	3,876	34	19,269	0	8	1	83	1	58
8/16	5	3,881	46	19,315	0	8	8	91	7	65
8/17	11	3,892	65	19,380	1	9	32	123	14	79
8/18	12	3,904	26	19,406	0	9	31	154	3	82
8/19	2	3,906	10	19,416	0	9	6	160	0	82
8/20	6	3,912	17	19,433	0	9	2	162	1	83
8/21	2	3,914	2	19,435	0	9	2	164	0	83
8/22	0	3,914	0	19,435	0	9	0	164	0	83

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/23	7	3,921	27	19,462	0	9	51	215	0	83
8/24	11	3,932	74	19,536	0	9	117	332	0	83
8/25	12	3,944	14	19,550	0	9	26	358	0	83
8/26	2	3,946	29	19,579	0	9	27	385	0	83
8/27	0	3,946	18	19,597	1	10	20	405	0	83
8/28	1	3,947	32	19,629	0	10	28	433	0	83
8/29	0	3,947	9	19,638	0	10	0	433	0	83
8/30	1	3,948	24	19,662	0	10	6	439	0	83
8/31	2	3,950	16	19,678	0	10	2	441	0	83
9/1	1	3,951	149	19,827	1	11	541	982	0	83
9/2	0	3,951	8	19,835	0	11	14	996	0	83
9/3	2	3,953	50	19,885	0	11	32	1,028	0	83
9/4	7	3,960	28	19,913	0	11	9	1,037	0	83
9/5	7	3,967	45	19,958	0	11	22	1,059	0	83
9/6	5	3,972	29	19,987	0	11	1	1,060	0	83
9/7	1	3,973	15	20,002	0	11	2	1,062	0	83
9/8	0	3,973	5	20,007	0	11	0	1,062	0	83
9/9	3	3,976	33	20,040	0	11	152	1,214	1	84
9/10	7	3,983	27	20,067	0	11	210	1,424	2	86
Total	3,983		20,067		11		1,424		86	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix C3.–Age and sex compositions by year for Snake River chum salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)						
				Male	Female	(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)
2001	8/06-8/21	297		54.5	45.5	0.0	1.0	43.1	55.6	0.7	0.0	0.0
2002	7/15-8/10	475		40.8	59.2	0.0	1.3	64.0	33.5	1.3	0.0	0.0
2003	7/06-9/06	171		54.4	45.6	0.0	0.0	73.7	22.2	4.1	0.0	0.0
2004	6/29-8/03	266		51.1	48.9	0.0	3.0	45.5	51.1	0.4	0.0	0.0
2005	6/29-9/09	386		44.0	56.0	0.0	1.3	83.7	13.7	1.3	0.0	0.0
2006	7/01-9/11	537		44.1	55.9	0.0	1.5	75.0	22.3	1.1	0.0	0.0
2007	7/03-9/11	607		51.4	48.6	0.0	0.2	49.8	46.6	3.5	0.0	0.0
2008	7/11-9/01	52	[a]									
2009	7/17-8/28	260		55.4	44.6	0.0	8.5	30.0	57.7	3.5	0.4	0.0
2010	7/07-9/07	305		38.4	61.6	0.0	1.0	90.8	8.2	0.0	0.0	0.0
2011	7/21-7/31	157		42.8	57.2	0.0	0.6	15.7	83.6	0.0	0.0	0.0
2012	7/12-8/14	112	[a]	52.3	47.7							
2013				No data collected								
2014	7/12-7/19	51	[a]									

[a] Sample size insufficient for sex composition analysis.

Appendix C4.–Age and sex compositions by year for Snake River coho salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)				
				Male	Female	(1.1)	(2.1)	(2.2)	(3.1)	(4.1)
2001	9/07-9/11	124	[a,b]	45.2	54.8					
2002	8/26-9/04	192		55.2	44.8	2.6	87.5	0.0	9.9	0.0
2003	8/04-9/07	132		47.0	53.0	6.8	83.3	0.0	9.8	0.0
2004	7/23-8/24	131		37.4	62.6	10.7	83.2	0.0	6.1	0.0
2005	7/30-9/10	188		61.7	38.3	9.6	86.2	0.0	4.3	0.0
2006	7/14-9/11	244		49.2	50.8	6.1	91.0	0.0	2.9	0.0
2007	8/02-9/12	105	[b]	59.0	41.0					
2008	8/08-9/05	47	[b]							
2009	8/10-8/28	27	[b]							
2010	8/16-9/03	130	[b]	46.9	53.1					
2011	8/18-9/12	60	[b]	59.8	40.2					
2012	7/14-8/14	5	[b]							
2013				No data collected						
2014				No data collected						

[a] No age data collected.

[b] Sample size insufficient for sex composition analysis.

Appendix C5.–Snake River weir water temperature (Temp.) and stream stage (Depth) observations, Norton Sound 2014.

	2014	
Date	Temp. (°C)	Depth (cm)
7/05		27.4
7/06		27.4
7/07		26.8
7/08	14.0	26.8
7/09	11.0	26.2
7/10	10.0	27.4
7/11	11.0	27.4
7/12	10.0	26.8
7/13	11.0	26.8
7/14	8.0	26.8
7/15	8.0	26.8
7/16	8.0	33.5
7/17	8.0	40.8
7/18	6.0	39.0
7/19	8.0	37.2
7/20	8.0	35.4
7/21	7.0	32.3
7/22	6.0	33.5
7/23	7.0	31.7
7/24	7.0	31.1
7/25	7.0	29.3
7/26	ND	28.0
7/27	8.0	28.7
7/28	ND	28.3
7/29	9.0	28.0
7/30	10.0	26.8
7/31	9.0	28.3
8/01	9.0	27.7
8/02	10.0	26.8
8/03	10.0	26.2
8/04	10.0	26.2
8/05	12.0	25.3
8/06	12.0	24.7
8/07	12.0	24.4
8/08	12.0	24.1
8/09	10.0	24.4
8/10	11.0	24.1
8/11	12.0	23.8
8/12	12.0	22.9
8/13	12.0	22.9
8/14	10.0	22.3
8/15	9.0	23.2
8/16	10.0	25.6
8/17	10.0	29.3
8/18	11.0	27.4
8/19	11.0	26.2
8/20	9.0	28.7
8/21	9.0	27.4

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	2014	
Date	Temp. (°C)	Depth (cm)
8/22	9.0	26.8
8/23	9.0	24.4
8/24	9.0	25.0
8/25	9.0	24.4
8/26	9.0	24.4
8/27	9.0	24.1
8/28	9.0	23.8
8/29	7.0	23.8
8/30	7.0	24.1
8/31	7.0	24.7
9/01	8.0	35.4
9/02	6.0	34.1
9/03	5.0	34.1
9/04	6.0	29.3
9/05	6.0	27.4
9/06	5.0	26.8
9/07	5.0	26.8
9/08	5.0	26.2
9/09	8.0	27.4
9/10	7.0	32.9

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.

APPENDIX D: NOME RIVER WEIR

Appendix D1.–Daily and cumulative (Cum.) passage of all salmonid species at Nome River weir, Norton Sound, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
7/05	1	1	8	8	0	0	0	0	0	0
7/06	52	53	15	23	0	0	0	0	0	0
7/07	29	82	8	31	0	0	0	0	1	1
7/08	11	93	1	32	0	0	0	0	0	1
7/09	79	172	5	37	0	0	0	0	0	1
7/10	16	188	9	46	0	0	0	0	0	1
7/11	10	198	5	51	0	0	0	0	1	2
7/12	305	503	55	106	0	0	0	0	1	3
7/13	581	1,084	615	721	0	0	0	0	0	3
7/14	73	1,157	73	794	1	1	0	0	0	3
7/15	106	1,263	10	804	0	1	0	0	0	3
7/16	17	1,280	10	814	0	1	1	1	0	3
7/17	7	1,287	14	828	0	1	0	1	0	3
7/18	73	1,360	36	864	0	1	2	3	1	4
7/19	29	1,389	21	885	0	1	0	3	0	4
7/20	169	1,558	224	1,109	0	1	1	4	0	4
7/21	149	1,707	244	1,353	0	1	1	5	2	6
7/22	179	1,886	421	1,774	0	1	2	7	2	8
7/23	883	2,769	2,319	4,093	0	1	6	13	1	9
7/24	26	2,795	114	4,207	0	1	4	17	0	9
7/25	151	2,946	1,315	5,522	0	1	12	29	0	9
7/26	24	2,970	62	5,584	0	1	5	34	0	9
7/27	135	3,105	327	5,911	1	2	3	37	1	10
7/28	51	3,156	217	6,128	0	2	3	40	0	10
7/29	1	3,157	1	6,129	0	2	0	40	0	10
7/30	54	3,211	454	6,583	0	2	2	42	1	11
7/31	194	3,405	266	6,849	0	2	2	44	1	12
8/01	86	3,491	272	7,121	0	2	60	104	0	12
8/02	259	3,750	1,010	8,131	0	2	32	136	0	12
8/03	26	3,776	231	8,362	1	3	3	139	0	12
8/04	24	3,800	94	8,456	0	3	3	142	0	12
8/05	26	3,826	93	8,549	0	3	0	142	0	12
8/06	164	3,990	399	8,948	2	5	54	196	0	12
8/07	41	4,031	166	9,114	0	5	7	203	0	12
8/08	114	4,145	234	9,348	0	5	86	289	0	12
8/09	33	4,178	180	9,528	0	5	47	336	0	12
8/10	11	4,189	64	9,592	0	5	7	343	1	13
8/11	54	4,243	145	9,737	2	7	27	370	0	13
8/12	22	4,265	46	9,783	2	9	8	378	0	13
8/13	26	4,291	80	9,863	1	10	24	402	0	13
8/14	13	4,304	32	9,895	1	11	5	407	0	13
8/15	48	4,352	54	9,949	0	11	38	445	1	14
8/16	34	4,386	54	10,003	1	12	58	503	2	16
8/17	42	4,428	32	10,035	0	12	85	588	4	20
8/18	12	4,440	22	10,057	0	12	83	671	1	21
8/19	24	4,464	35	10,092	0	12	168	839	0	21
8/20	6	4,470	14	10,106	0	12	12	851	0	21
8/21	18	4,488	5	10,111	0	12	6	857	0	21
8/22	78	4,566	23	10,134	0	12	270	1,127	1	22

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/23	10	4,576	14	10,148	0	12	65	1,192	1	23
8/24	7	4,583	5	10,153	0	12	48	1,240	0	23
8/25	10	4,593	11	10,164	0	12	24	1,264	0	23
8/26	13	4,606	13	10,177	0	12	56	1,320	3	26
8/27	19	4,625	7	10,184	0	12	134	1,454	1	27
8/28	17	4,642	6	10,190	0	12	62	1,516	1	28
8/29	4	4,646	4	10,194	1	13	24	1,540	1	29
8/30	2	4,648	2	10,196	1	14	3	1,543	0	29
8/31	20	4,668	10	10,206	0	14	85	1,628	0	29
9/01	2	4,670	1	10,207	0	14	2	1,630	0	29
9/02	22	4,692	6	10,213	0	14	334	1,964	2	31
9/03	4	4,696	6	10,219	0	14	51	2,015	1	32
9/04	26	4,722	7	10,226	0	14	119	2,134	3	35
9/05	20	4,742	7	10,233	0	14	25	2,159	3	38
9/06	5	4,747	7	10,240	0	14	2	2,161	0	38
9/07	8	4,755	5	10,245	0	14	5	2,166	0	38
9/08	4	4,759	1	10,246	0	14	15	2,181	0	38
9/09	3	4,762	1	10,247	0	14	0	2,181	0	38
9/10	0	4,762	1	10,248	0	14	2	2,183	0	38
9/11	8	4,770	0	10,248	0	14	32	2,215	0	38
9/12	22	4,792	7	10,255	0	14	363	2,578	0	38
9/13	3	4,795	0	10,255	0	14	34	2,612	0	38
9/14	7	4,802	0	10,255	0	14	6	2,618	0	38
9/15	2	4,804	1	10,256	0	14	2	2,620	0	38
9/16	7	4,811	1	10,257	0	14	4	2,624	0	38
Total	4,811		10,257		14		2,624		38	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix D2.–Daily and cumulative (Cum.) passage of all salmonid species at Nome River weir, Norton Sound, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
7/05	15	15	4	4	0	0	0	0	0	0
7/06	407	422	833	837	0	0	0	0	0	0
7/07	674	1,096	7,617	8,454	0	0	0	0	3	3
7/08	293	1,389	4,894	13,348	0	0	0	0	1	4
7/09	47	1,436	153	13,501	0	0	0	0	0	4
7/10	94	1,530	500	14,001	0	0	0	0	0	4
7/11	32	1,562	237	14,238	0	0	0	0	0	4
7/12	462	2,024	3,499	17,737	0	0	0	0	7	11
7/13	87	2,111	1,120	18,857	0	0	0	0	0	11
7/14	35	2,146	199	19,056	1	1	0	0	0	11
7/15	18	2,164	31	19,087	0	1	0	0	0	11
7/16	282	2,446	948	20,035	0	1	0	0	0	11
7/17	564	3,010	3,583	23,618	0	1	0	0	1	12
7/18	165	3,175	4,018	27,636	0	1	0	0	1	13
7/19	15	3,190	851	28,487	0	1	0	0	0	13
7/20	8	3,198	90	28,577	0	1	0	0	0	13
7/21	9	3,207	696	29,273	0	1	2	2	0	13
7/22	52	3,259	2,240	31,513	0	1	0	2	0	13
7/23	206	3,465	6,451	37,964	0	1	0	2	0	13
7/24	51	3,516	1,644	39,608	0	1	0	2	0	13
7/25	88	3,604	3,377	42,985	0	1	0	2	0	13
7/26	114	3,718	4,336	47,321	0	1	0	2	0	13
7/27	238	3,956	7,319	54,640	0	1	2	4	0	13
7/28	210	4,166	6,189	60,829	0	1	3	7	0	13
7/29	105	4,271	5,725	66,554	0	1	3	10	0	13
7/30	165	4,436	6,510	73,064	0	1	5	15	0	13
7/31	125	4,561	6,610	79,674	0	1	7	22	0	13
8/01	62	4,623	1,946	81,620	0	1	1	23	0	13
8/02	305	4,928	4,855	86,475	0	1	0	23	2	15
8/03	135	5,063	3,585	90,060	1	2	6	29	0	15
8/04	58	5,121	1,647	91,707	0	2	8	37	0	15
8/05	59	5,180	672	92,379	0	2	9	46	1	16
8/06	49	5,229	883	93,262	0	2	21	67	0	16
8/07	18	5,247	365	93,627	0	2	5	72	1	17
8/08	21	5,268	391	94,018	0	2	3	75	0	17
8/09	42	5,310	457	94,475	0	2	10	85	1	18
8/10	33	5,343	247	94,722	0	2	5	90	0	18
8/11	11	5,354	122	94,844	2	4	51	141	1	19
8/12	15	5,369	169	95,013	0	4	36	177	1	20
8/13	11	5,380	79	95,092	1	5	96	273	0	20
8/14	4	5,384	44	95,136	0	5	3	276	0	20
8/15	11	5,395	61	95,197	0	5	3	279	0	20
8/16	30	5,425	74	95,271	1	6	118	397	0	20
8/17	11	5,436	48	95,319	0	6	215	612	0	20
8/18	7	5,443	27	95,346	0	6	15	627	0	20
8/19	0	5,443	10	95,356	0	6	0	627	0	20
8/20	8	5,451	29	95,385	0	6	5	632	0	20
8/21	13	5,464	37	95,422	0	6	4	636	3	23
8/22	8	5,472	31	95,453	0	6	4	640	0	23

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/23	9	5,481	50	95,503	0	6	96	736	2	25
8/24	7	5,488	76	95,579	0	6	164	900	0	25
8/25	5	5,493	29	95,608	0	6	49	949	0	25
8/26	1	5,494	28	95,636	0	6	5	954	0	25
8/27	9	5,503	63	95,699	0	6	22	976	1	26
8/28	4	5,507	55	95,754	0	6	20	996	0	26
8/29	6	5,513	32	95,786	1	7	18	1,014	0	26
8/30	9	5,522	92	95,878	1	8	147	1,161	0	26
8/31	1	5,523	28	95,906	0	8	14	1,175	0	26
9/01	21	5,544	228	96,134	0	8	865	2,040	7	33
9/02	2	5,546	34	96,168	0	8	33	2,073	1	34
9/03	14	5,560	53	96,221	0	8	28	2,101	0	34
9/04	4	5,564	51	96,272	0	8	19	2,120	0	34
9/05	8	5,572	20	96,292	0	8	8	2,128	0	34
9/06	6	5,578	38	96,330	0	8	166	2,294	0	34
9/07	2	5,580	19	96,349	0	8	19	2,313	0	34
9/08	0	5,580	7	96,356	0	8	2	2,315	0	34
9/09	6	5,586	19	96,375	0	8	120	2,435	0	34
9/10	3	5,589	21	96,396	0	8	199	2,634	0	34
9/11	0	5,589	1	96,397	0	8	3	2,637	0	34
Total	5,589		96,397		8		2,637		34	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix D3.–Age and sex compositions by year for Nome River chum salmon ASL samples, 1995–2014.

Year	Sampling Dates	Number of Samples	Percent by Sex		Percent by (Age Group)						
			Male	Female	(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)
1995	7/20-8/29	1,272	49.0	51.0	0.0	2.0	56.0	40.0	2.0	0.0	0.0
1996				No data collected							
1997	7/25-7/31	173	46.0	53.0	0.0	1.0	36.0	61.0	2.0	0.0	0.0
1998				No data collected							
1999				No data collected							
2000				No data collected							
2001	7/24-8/03	234	45.7	54.3	0.0	1.3	12.8	85.9	0.0	0.0	0.0
2002	7/04-8/10	438	46.1	53.9	0.0	0.7	64.6	29.5	5.3	0.0	0.0
2003	7/07-8/23	158	54.3	45.7	0.0	0.0	82.9	15.2	1.9	0.0	0.0
2004	7/1-/8/06	157	42.7	57.3	0.0	7.0	49.7	43.3	0.0	0.0	0.0
2005	7/03-9/04	326	38.0	62.0	0.0	1.2	89.6	7.4	1.8	0.0	0.0
2006	7/06-8/10	458	47.4	52.6	0.0	1.7	52.8	45.4	0.0	0.0	0.0
2007	7/06-9/06	678	45.4	54.6	0.0	0.0	58.0	38.1	4.0	0.0	0.0
2008	7/23-9/06	222	52.3	47.7	0.0	0.5	43.2	47.3	8.6	0.5	0.0
2009	7/12-8/11	223	39.0	61.0	0.0	17.0	23.3	54.7	4.9	0.0	0.0
2010	7/10-8/11	240	60.0	40.0	0.0	1.7	94.6	3.8	0.0	0.0	0.0
2011	7/21-9/08	146	39.2	60.8	0.0	0.0	15.8	84.2	0.0	0.0	0.0
2012	7/07-8/15	126 [a]	38.7	61.3							
2013	7/13-8/18	183	39.0	61.0	0.0	0.0	65.7	33.8	0.5	0.0	0.0
2014	7/10-7/29	180	40.0	60.0	0.0	0.0	51.4	47.1	1.4	0.0	0.0

[a] Sample size insufficient for age composition analysis.

Appendix D4.–Age and sex compositions by year for Nome River coho salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)				
				Male	Female	(1.1)	(2.1)	(2.2)	(3.1)	(4.1)
2001	8/10-9/10	445		51.2	48.8	10.1	89.2	0.0	0.7	0.0
2002	8/11-8/28	139		51.1	48.9	1.4	80.6	0.0	16.5	1.4
2003	8/20-9/05	144		55.6	44.4	14.6	78.5	0.7	6.3	0.0
2004	8/23-8/27	150		66.0	34.0	23.3	72.7	0.0	4.0	0.0
2005	6/26-9/04	158		44.9	55.1	8.2	90.5	0.0	1.3	0.0
2006	7/24-9/02	191		39.3	60.7	8.9	87.0	0.0	4.2	0.0
2007	7/31-9/12	104	[a]	48.1	51.9					
2008	8/08-9/09	122	[a]	45.9	54.1					
2009	8/28-9/09	130		54.6	45.4	13.8	78.5	0.0	7.7	0.0
2010	8/20-9/06	116	[a]	54.3	45.7					
2011	7/21-8/06	84	[a]	56.1	43.9					
2012				No data collected						
2013	8/18-9/15	31	[a]							
2014				No data collected						

[a] Sample size insufficient for sex composition analysis.

Appendix D5.–Nome River weir water temperature (Temp.) and stream stage (Depth) observations, Norton Sound 2013–2014.

	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
7/05	ND	65.0		
7/06	ND	66.0	ND	43.9
7/07	10.0	64.0	ND	43.9
7/08	13.0	59.9	ND	43.3
7/09	14.0	54.9	13.0	42.1
7/10	11.0	52.8	11.0	44.5
7/11	13.0	50.3	12.0	42.7
7/12	15.0	48.8	12.0	42.7
7/13	17.0	47.2	14.0	41.8
7/14	11.5	61.0	10.0	53.6
7/15	11.0	65.0	9.0	45.7
7/16	9.0	59.9	8.0	48.2
7/17	9.0	56.9	9.0	51.8
7/18	11.0	54.9	7.0	51.8
7/19	10.0	53.3	9.0	47.2
7/20	10.0	52.3	8.0	46.3
7/21	11.0	50.8	8.0	45.1
7/22	10.0	49.8	7.0	45.7
7/23	12.0	49.3	10.0	45.1
7/24	14.0	47.8	8.0	44.5
7/25	14.0	46.7	7.0	42.1
7/26	16.0	46.7	9.0	41.5
7/27	16.0	45.7	10.0	40.8
7/28	13.0	45.2	10.0	43.3
7/29	13.0	45.0	10.0	41.5
7/30	14.0	44.5	11.0	40.2
7/31	16.5	43.7	11.0	41.5
8/01	16.0	43.2	12.0	41.5
8/02	15.0	49.3	11.0	40.8
8/03	13.0	57.4	12.0	39.6
8/04	13.0	58.7	12.0	39.0
8/05	13.0	54.9	13.0	39.0
8/06	13.0	62.0	14.0	38.4
8/07	15.0	62.0	13.0	39.0
8/08	12.0	69.6	12.0	39.0
8/09	12.0	71.6	14.0	40.2

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	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
8/10	11.0	72.1	14.0	39.0
8/11	13.0	76.2	15.0	38.4
8/12	12.0	71.1	15.0	38.4
8/13	13.0	67.6	14.0	39.0
8/14	13.0	66.0	13.0	39.0
8/15	11.0	72.1	12.0	39.6
8/16	14.0	66.5	13.0	42.1
8/17	13.0	63.5	13.0	52.4
8/18	9.0	63.0	13.0	48.2
8/19	12.0	64.0	13.0	45.1
8/20	11.0	61.0	11.0	45.1
8/21	11.0	60.5	10.0	49.4
8/22	12.0	63.5	10.0	45.7
8/23	13.0	59.4	14.0	43.9
8/24	11.0	57.4	11.0	43.3
8/25	12.0	56.9	10.0	42.7
8/26	11.0	58.4	11.0	42.1
8/27	11.0	57.9	10.0	43.3
8/28	10.0	55.9	11.0	42.7
8/29	9.0	54.4	6.0	42.1
8/30	8.0	53.8	7.0	43.3
8/31	9.0	53.3	7.0	46.9
9/01	9.0	52.3	11.0	54.3
9/02	8.0	55.4	6.0	57.9
9/03	9.0	58.9	5.0	50.6
9/04	10.0	65.5	5.0	47.5
9/05	10.0	62.5	6.0	45.1
9/06	10.0	58.9	5.0	43.9
9/07	9.0	57.2	5.0	42.7
9/08	8.0	55.9	6.0	42.7
9/09	8.0	54.9	8.0	44.5
9/10	8.0	55.4	9.0	47.5
9/11	8.0	54.9		
9/12	8.0	85.9		
9/13	8.0	70.1		
9/14	6.0	64.0		
9/15	7.0	62.0		
9/16	7.0	61.0		

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.

APPENDIX E: ELDORADO RIVER WEIR

Appendix E1.–Daily and cumulative (Cum.) passage of all salmonid species at Eldorado River weir, Norton Sound, 2013.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
6/29	0	0	4	4	0	0	0	0	0	0
6/30 [a]	10	10	0	4	0	0	0	0	0	0
7/01	10	20	0	4	0	0	0	0	0	0
7/02	0	20	0	4	0	0	0	0	0	0
7/03	14	34	7	11	0	0	0	0	0	0
7/04	87	121	0	11	0	0	0	0	0	0
7/05	311	432	0	11	0	0	0	0	0	0
7/06	1,168	1,600	0	11	0	0	0	0	0	0
7/07	1,335	2,935	0	11	0	0	0	0	0	0
7/08	774	3,709	1	12	0	0	0	0	0	0
7/09	1,394	5,103	1	13	0	0	0	0	0	0
7/10	963	6,066	0	13	0	0	0	0	0	0
7/11	1,090	7,156	1	14	0	0	0	0	0	0
7/12	1,111	8,267	0	14	0	0	0	0	0	0
7/13	1,452	9,719	4	18	0	0	0	0	0	0
7/14	1,197	10,916	10	28	2	2	0	0	0	0
7/15	1,882	12,798	38	66	0	2	0	0	0	0
7/16	259	13,057	14	80	0	2	0	0	0	0
7/17	240	13,297	11	91	0	2	0	0	0	0
7/18	2,242	15,539	102	193	2	4	0	0	0	0
7/19	1,598	17,137	66	259	0	4	0	0	0	0
7/20	617	17,754	29	288	0	4	0	0	0	0
7/21	1,866	19,620	108	396	0	4	0	0	0	0
7/22	1,063	20,683	100	496	0	4	0	0	0	0
7/23	1,153	21,836	49	545	2	6	0	0	0	0
7/24	925	22,761	70	615	0	6	0	0	0	0
7/25	193	22,954	46	661	0	6	0	0	0	0
7/26	893	23,847	82	743	3	9	0	0	0	0
7/27	763	24,610	77	820	0	9	1	1	0	0
7/28	268	24,878	79	899	0	9	3	4	0	0
7/29	20	24,898	8	907	0	9	0	4	0	0
7/30	258	25,156	52	959	0	9	0	4	0	0
7/31	224	25,380	22	981	0	9	0	4	0	0
8/01	319	25,699	15	996	0	9	2	6	0	0
8/02	167	25,866	9	1,005	0	9	7	13	0	0
8/03	58	25,924	6	1,011	0	9	0	13	0	0
8/04	121	26,045	13	1,024	0	9	2	15	0	0
8/05	86	26,131	5	1,029	0	9	0	15	0	0
Total	26,131		1,029		9		15		0	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile. Quartiles are not shown for coho salmon because the entire run was not counted.

[a] Partial day count because weir was flooded.

Appendix E2.–Daily and cumulative (Cum.) passage of all salmonid species at Eldorado River weir, Norton Sound, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
6/23	0	0	0	0	0	0	0	0	0	0
6/24	17	17	4	4	0	0	0	0	0	0
6/25	127	144	2	6	0	0	0	0	0	0
6/26	193	337	7	13	0	0	0	0	0	0
6/27	477	814	53	66	3	3	0	0	0	0
6/28	322	1,136	35	101	0	3	0	0	0	0
6/29	468	1,604	53	154	0	3	0	0	0	0
6/30	827	2,431	72	226	0	3	0	0	0	0
7/01	40	2,471	13	239	0	3	0	0	0	0
7/02	197	2,668	59	298	1	4	0	0	0	0
7/03	417	3,085	96	394	0	4	0	0	0	0
7/04	1,220	4,305	322	716	0	4	0	0	0	0
7/05	1,637	5,942	616	1,332	0	4	0	0	0	0
7/06	1,960	7,902	1,463	2,795	3	7	0	0	0	0
7/07	2,200	10,102	3,013	5,808	1	8	0	0	0	0
7/08	412	10,514	1,562	7,370	1	9	0	0	0	0
7/09	1,361	11,875	3,558	10,928	3	12	0	0	0	0
7/10	873	12,748	1,887	12,815	0	12	0	0	0	0
7/11	530	13,278	2,581	15,396	0	12	0	0	0	0
7/12	3,091	16,369	5,360	20,756	2	14	0	0	0	0
7/13	1,148	17,517	4,959	25,715	0	14	0	0	0	0
7/14	10	17,527	84	25,799	0	14	0	0	0	0
7/15	407	17,934	814	26,613	0	14	0	0	0	0
7/16	1,322	19,256	2,982	29,595	1	15	0	0	0	0
7/17	1,995	21,251	4,613	34,208	0	15	0	0	0	0
7/18	838	22,089	1,152	35,360	0	15	0	0	0	0
7/19	1,165	23,254	2,797	38,157	0	15	0	0	0	0
7/20	112	23,366	250	38,407	0	15	0	0	0	0
7/21	596	23,962	939	39,346	0	15	0	0	0	0
7/22	1,657	25,619	3,550	42,896	1	16	0	0	0	0
7/23	434	26,053	1,507	44,403	1	17	0	0	0	0
7/24	454	26,507	808	45,211	1	18	0	0	0	0
7/25	312	26,819	618	45,829	0	18	0	0	0	0
7/26	228	27,047	910	46,739	0	18	0	0	0	0
7/27	7	27,054	7	46,746	0	18	0	0	0	0
Total	27,054		46,746		18		0		0	

Note: Quartiles are not shown because the target operational period of the project was not fully monitored.

Appendix E3.–Age and sex compositions by year for Eldorado River chum salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)						
				Male	Female	(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)
2001	7/22-8/16	586		58.4	41.6	0.0	0.5	4.5	94.4	0.6	0.0	0.0
2002	7/04-9/03	367		49.0	51.0	0.0	1.6	88.3	6.5	3.5	0.0	0.0
2003	7/05-7/24	301		62.8	37.2	0.0	0.0	53.8	45.5	0.7	0.0	0.0
2004	6/23-9/09	272		50.7	49.3	0.0	4.0	48.9	46.0	1.1	0.0	0.0
2005	6/28-8/28	548		42.3	57.7	0.0	1.6	84.9	13.1	0.4	0.0	0.0
2006	6/29-7/30	459		46.4	53.6	0.0	0.4	57.5	41.0	1.0	0.0	0.0
2007	6/29-8/01	443		54.9	45.1	0.0	0.5	47.0	49.0	3.6	0.0	0.0
2008	6/29-7/24	128	[a]	62.5	37.5							
2009	7/02-8/03	539		55.5	44.5	0.0	15.2	41.3	34.9	8.2	0.4	0.0
2010	7/03-7/23	240		49.2	50.8	0.0	0.4	94.6	4.6	0.4	0.0	0.0
2011	7/02-7/30	210		62.9	37.1	0.0	0.0	3.1	96.4	0.4	0.0	0.0
2012	7/03-7/22	157		61.3	38.7	0.0	1.1	71.5	21.0	6.5	0.0	0.0
2013	7/03-7/30	198		66.1	33.9	0.0	0.5	52.0	47.5	0.0	0.0	0.0
2014	7/01-7/26	190		63.4	36.6	0.0	0.9	57.3	39.0	2.8	0.0	0.0

[a] Sample size insufficient for age composition analysis.

Appendix E4.–Eldorado River weir water temperature (Temp.) and stream stage (Depth) observations, Norton Sound, 2013.

	2013	
Date	Temp. (°C)	Depth (cm)
6/23		
6/24		
6/25		
6/26		
6/27		
6/28		
6/29	ND	1.42
6/30	8.0	2.90
7/01	8.0	3.50
7/02	8.0	2.58
7/03	8.0	2.80
7/04	6.0	2.48
7/05	6.0	2.60
7/06	6.0	2.55
7/07	7.0	2.42
7/08	7.0	2.22
7/09	8.0	2.06
7/10	9.0	1.94
7/11	8.0	1.86
7/12	10.0	1.78
7/13	11.0	1.72
7/14	13.0	2.30
7/15	9.0	3.00
7/16	8.0	2.38
7/17	8.0	2.27
7/18	8.0	2.16
7/19	9.0	2.10
7/20	8.0	2.05
7/21	8.0	2.00
7/22	8.0	1.98
7/23	8.0	1.94
7/24	ND	1.84
7/25	9.0	1.81
7/26	9.0	1.76
7/27	11.0	1.72
7/28	11.0	1.69
7/29	10.0	1.69
7/30	10.0	1.65
7/31	10.0	1.60
8/01	12.0	1.60
8/02	13.0	1.94
8/03	11.0	1.96
8/04	10.0	2.02
8/05	9.0	1.98

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.

APPENDIX F: SOLOMON RIVER WEIR

Appendix F1.–Daily and cumulative (Cum.) migration of all salmonid species past Solomon River weir, Norton Sound, 2013.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
7/05	18	18	0	0	0	0	0	0	0	0
7/06	10	28	0	0	0	0	0	0	0	0
7/07	24	52	1	1	0	0	0	0	0	0
7/08	2	54	0	1	0	0	0	0	0	0
7/09	22	76	2	3	0	0	0	0	0	0
7/10	9	85	0	3	0	0	0	0	0	0
7/11	37	122	0	3	0	0	0	0	0	0
7/12	41	163	1	4	0	0	0	0	0	0
7/13	42	205	26	30	0	0	0	0	0	0
7/14	157	362	60	90	0	0	0	0	0	0
7/15	25	387	15	105	0	0	0	0	0	0
7/16	2	389	2	107	0	0	0	0	0	0
7/17	19	408	54	161	0	0	0	0	0	0
7/18	48	456	84	245	0	0	1	1	0	0
7/19	79	535	53	298	0	0	0	1	0	0
7/20	68	603	91	389	0	0	0	1	0	0
7/21	87	690	249	638	0	0	0	1	0	0
7/22	20	710	165	803	0	0	0	1	0	0
7/23	90	800	406	1,209	0	0	0	1	0	0
7/24	41	841	93	1,302	0	0	0	1	0	0
7/25	76	917	282	1,584	0	0	0	1	0	0
7/26	46	963	142	1,726	0	0	0	1	0	0
7/27	37	1,000	116	1,842	0	0	0	1	0	0
7/28	9	1,009	15	1,857	0	0	0	1	0	0
7/29	21	1,030	27	1,884	0	0	0	1	0	0
7/30	41	1,071	102	1,986	0	0	0	1	0	0
7/31	33	1,104	91	2,077	0	0	0	1	0	0
8/01	49	1,153	79	2,156	0	0	1	2	0	0
8/02	12	1,165	46	2,202	0	0	0	2	0	0
8/03	13	1,178	23	2,225	0	0	0	2	0	0
8/04	62	1,240	119	2,344	0	0	5	7	1	1
8/05	8	1,248	16	2,360	0	0	0	7	0	1
8/06	22	1,270	72	2,432	0	0	7	14	0	1
8/07	10	1,280	77	2,509	0	0	1	15	0	1
8/08	14	1,294	66	2,575	0	0	18	33	0	1
8/09	6	1,300	6	2,581	0	0	0	33	0	1
8/10	4	1,304	16	2,597	0	0	1	34	0	1
8/11	11	1,315	23	2,620	0	0	45	79	1	2
8/12	5	1,320	14	2,634	0	0	5	84	0	2
8/13	2	1,322	15	2,649	0	0	0	84	0	2
8/14	5	1,327	2	2,651	0	0	2	86	0	2
8/15	4	1,331	9	2,660	0	0	3	89	0	2
8/16	7	1,338	26	2,686	0	0	20	109	0	2
8/17	6	1,344	20	2,706	0	0	4	113	0	2
8/18	0	1,344	0	2,706	0	0	0	113	0	2
8/19	3	1,347	5	2,711	0	0	16	129	0	2
8/20	1	1,348	0	2,711	0	0	0	129	0	2
8/21	0	1,348	0	2,711	0	0	0	129	0	2

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Appendix F1.–Page 2 of 2.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/22	16	1,364	10	2,721	0	0	24	153	1	3
8/23	4	1,368	3	2,724	0	0	2	155	0	3
8/24	4	1,372	4	2,728	0	0	1	156	0	3
8/25	4	1,376	3	2,731	0	0	5	161	0	3
8/26	1	1,377	2	2,733	0	0	7	168	0	3
Total	1,377		2,733		0		168		3	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile. Quartiles are not shown for coho salmon because entire run was not counted.

Appendix F2.–Daily and cumulative (Cum.) migration of all salmonid species past Solomon River weir, Norton Sound, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
7/02	0	0	0	0	0	0	0	0	0	0
7/03	0	0	0	0	0	0	0	0	0	0
7/04	9	9	0	0	0	0	0	0	0	0
7/05	9	18	7	7	0	0	0	0	0	0
7/06	7	25	6	13	0	0	0	0	0	0
7/07	3	28	3	16	0	0	0	0	0	0
7/08	0	28	0	16	0	0	0	0	0	0
7/09	0	28	0	16	0	0	0	0	0	0
7/10	1	29	0	16	0	0	0	0	0	0
7/11	0	29	4	20	0	0	0	0	0	0
7/12	237	266	1,698	1,718	0	0	1	1	0	0
7/13	5	271	22	1,740	0	0	0	1	0	0
7/14	26	297	1,142	2,882	0	0	0	1	0	0
7/15	3	300	84	2,966	0	0	0	1	0	0
7/16	161	461	2,066	5,032	0	0	0	1	0	0
7/17	220	681	2,147	7,179	0	0	4	5	0	0
7/18	16	697	509	7,688	0	0	1	6	0	0
7/19	46	743	569	8,257	0	0	0	6	0	0
7/20	5	748	132	8,389	0	0	0	6	0	0
7/21	46	794	1,118	9,507	0	0	0	6	0	0
7/22	74	868	1,717	11,224	0	0	0	6	0	0
7/23	19	887	970	12,194	0	0	1	7	0	0
7/24	46	933	744	12,938	0	0	0	7	0	0
7/25	44	977	478	13,416	0	0	1	8	0	0
7/26	80	1,057	981	14,397	0	0	0	8	0	0
7/27	11	1,068	539	14,936	0	0	0	8	0	0
7/28	56	1,124	868	15,804	0	0	4	12	0	0
7/29	34	1,158	597	16,401	0	0	0	12	0	0
7/30	18	1,176	529	16,930	0	0	0	12	0	0
7/31	39	1,215	843	17,773	0	0	1	13	0	0
8/01	34	1,249	783	18,556	0	0	2	15	0	0
8/02	64	1,313	796	19,352	0	0	4	19	0	0
8/03	10	1,323	382	19,734	0	0	1	20	0	0
8/04	11	1,334	131	19,865	0	0	0	20	0	0
8/05	6	1,340	193	20,058	0	0	0	20	0	0
8/06	6	1,346	177	20,235	0	0	1	21	0	0
8/07	24	1,370	123	20,358	0	0	2	23	0	0
8/08	5	1,375	21	20,379	0	0	0	23	0	0
8/09	16	1,391	49	20,428	0	0	1	24	0	0
8/10	27	1,418	57	20,485	0	0	5	29	0	0
8/11	20	1,438	75	20,560	0	0	4	33	0	0
8/12	25	1,463	32	20,592	0	0	11	44	0	0
8/13	5	1,468	24	20,616	0	0	2	46	0	0
8/14	1	1,469	0	20,616	0	0	2	48	0	0
8/15	4	1,473	0	20,616	0	0	1	49	0	0
8/16	5	1,478	0	20,616	0	0	0	49	0	0
8/17	10	1,488	0	20,616	0	0	22	71	0	0
8/18	6	1,494	0	20,616	0	0	6	77	0	0

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Appendix F2.–Page 2 of 2.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/19	1	1,495	0	20,616	0	0	1	78	0	0
8/20	7	1,502	0	20,616	0	0	1	79	0	0
Total	1,502		20,616		0		79		0	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile. Quartiles are not shown for coho salmon because entire run was not counted.

Appendix F3.–Solomon River weir water temperature (Temp.) and stream stage (Depth) observations, Norton Sound, 2013–2014.

	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)[a]	Depth (cm)
7/02			ND	ND
7/03			7.4	ND
7/04			6.1	ND
7/05	6.3	117.0	8.6	ND
7/06	6.5	110.3	10.7	ND
7/07	7.3	103.6	11.5	ND
7/08	7.8	96.0	10.8	71.0
7/09	9.5	88.4	11.0	ND
7/10	8.5	83.5	10.2	70.1
7/11	9.3	79.9	11.0	ND
7/12	11.3	78.0	10.4	71.9
7/13	11.8	76.2	11.8	ND
7/14	10.0	95.7	9.6	76.2
7/15	10.0	109.7	8.6	78.6
7/16	8.5	94.5	8.2	82.3
7/17	8.0	90.2	8.3	91.4
7/18	8.3	87.2	6.8	94.5
7/19	8.3	86.0	8.0	82.3
7/20	7.8	86.0	6.5	83.8
7/21	8.3	83.8	7.3	80.8
7/22	7.8	81.7	6.7	82.3
7/23	8.8	80.2	8.0	80.8
7/24	9.5	78.6	7.1	80.8
7/25	9.5	76.8	6.6	78.6
7/26	10.5	75.6	7.9	77.4
7/27	9.8	74.4	9.0	76.2
7/28	9.8	73.8	7.9	ND
7/29	10.0	73.2	8.2	77.1
7/30	10.5	71.9	9.3	75.6
7/31	11.5	70.7	9.8	79.2
8/01	12.3	70.1	9.8	ND
8/02	11.8	72.8	9.9	74.7
8/03	11.0	72.5	10.5	76.2
8/04	11.3	78.9	11.1	77.4
8/05	10.0	78.0	11.0	ND
8/06	10.5	89.3	11.2	76.2
8/07	11.0	85.3	11.5	ND
8/08	10.0	99.7	11.0	76.2
8/09	10.0	95.7	11.2	75.6
8/10	8.5	93.6	10.7	

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	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)[a]	Depth (cm)
8/11	10.0	118.9	11.5	73.2
8/12	11.0	105.2	12.4	79.9
8/13	12.0	98.1	11.8	76.2
8/14	12.0	95.1	10.2	75.6
8/15	10.0	97.5	9.5	75.9
8/16	12.0	95.1	11.1	83.8
8/17	11.0	92.7	10.7	83.8
8/18	9.0	90.8	10.4	82.3
8/19	11.0	96.6	10.9	76.2
8/20	10.0	89.6	9.4	78.6
8/21	10.0	89.0	8.5	77.7
8/22	10.0	91.4		
8/23	10.0	91.4		
8/24	12.0	87.2		
8/25	10.0	86.0		
8/26	10.0	87.2		

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.

[a] Temperature recorded with a HOBO Water Temp Pro v2 logger.

APPENDIX G: FISH RIVER TOWER

Appendix G1.–Expanded daily and cumulative (Cum.) migration of all salmonid species past Fish River counting tower, Norton Sound, 2014.

Date		Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
6/18	[a]	15	15	6	6	0	0	0	0
6/19	[a]	76	91	32	38	0	0	0	0
6/20	[a]	96	187	156	194	0	0	0	0
6/21	[a]	63	250	174	368	0	0	0	0
6/22	[a]	120	370	168	536	0	0	0	0
6/23	[a]	372	742	237	773	27	27	0	0
6/24	[a]	534	1,276	411	1,184	45	72	0	0
6/25	[a]	1,074	2,350	495	1,679	27	99	0	0
6/26	[a]	561	2,911	357	2,036	12	111	0	0
6/27	[a]	1,365	4,276	828	2,864	51	162	0	0
6/28	[a]	411	4,687	432	3,296	21	183	0	0
6/29	[a]	516	5,203	465	3,761	36	219	0	0
6/30	[a]	1,068	6,271	489	4,250	57	276	0	0
7/01	[a]	1,380	7,651	861	5,111	60	336	0	0
7/02	[a]	693	8,344	375	5,486	42	378	0	0
7/03	[a]	1,002	9,346	447	5,933	21	399	0	0
7/04	[a]	1,065	10,411	432	6,365	27	426	0	0
7/05	[a]	4,956	15,367	6,195	12,560	90	516	0	0
7/06	[a]	6,810	22,177	27,018	39,578	81	597	0	0
7/07	[a]	3,309	25,486	42,117	81,695	63	660	0	0
7/08	[a]	2,559	28,045	23,427	105,122	42	702	0	0
7/09	[a]	1,227	29,272	19,470	124,592	57	759	36	36
7/10	[a]	1,202	30,474	8,801	133,393	71	830	10	46
7/11	[a]	1,578	32,052	5,652	139,045	39	869	3	49
7/12		3,954	36,006	7,980	147,025	72	941	18	67
7/13		3,516	39,522	12,696	159,721	6	947	0	67
7/14		1,155	40,677	4,820	164,541	19	966	42	109
7/15		2,468	43,145	13,369	177,910	46	1,012	15	124
7/16		2,332	45,477	13,172	191,082	44	1,056	29	153
7/17		1,980	47,457	13,118	204,200	37	1,093	43	196
7/18		1,480	48,937	11,309	215,509	30	1,123	52	248
7/19		1,299	50,236	8,391	223,900	25	1,148	69	317
7/20		1,147	51,383	6,842	230,742	21	1,169	89	406
7/21		1,093	52,476	5,560	236,302	16	1,185	104	510
7/22		1,055	53,531	5,140	241,442	10	1,195	130	640
7/23		977	54,508	4,919	246,361	7	1,202	160	800
7/24		808	55,316	4,789	251,150	2	1,204	190	990
7/25	[a]	637	55,953	4,362	255,512	1	1,205	230	1,220
7/26	[a]	348	56,301	5,979	261,491	0	1,205	117	1,337
7/27	[a]	657	56,958	5,916	267,407	0	1,205	168	1,505
7/28	[a]	732	57,690	5,550	272,957	0	1,205	162	1,667
7/29	[a]	810	58,500	5,310	278,267	0	1,205	108	1,775
7/30	[a]	1,128	59,628	7,101	285,368	0	1,205	210	1,985
7/31	[a]	735	60,363	4,830	290,198	0	1,205	237	2,222
8/01	[a]	588	60,951	4,092	294,290	0	1,205	210	2,432
8/02	[a]	744	61,695	3,756	298,046	0	1,205	321	2,753
8/03	[a]	642	62,337	3,000	301,046	0	1,205	369	3,122
8/04	[a]	363	62,700	2,520	303,566	0	1,205	375	3,497

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Appendix G1.–Page 2 of 2.

Date		Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
8/05	[a]	189	62,889	1,854	305,420	0	1,205	477	3,974
8/06	[a]	96	62,985	1,725	307,145	0	1,205	402	4,376
8/07	[a]	66	63,051	1,365	308,510	0	1,205	309	4,685
8/08		90	63,141	1,638	310,148	0	1,205	762	5,447
8/09		99	63,240	729	310,877	0	1,205	686	6,133
8/10		48	63,288	504	311,381	0	1,205	1,128	7,261
8/11		24	63,312	420	311,801	0	1,205	1,584	8,845
8/12		6	63,318	204	312,005	0	1,205	1,434	10,279
8/13		6	63,324	114	312,119	0	1,205	786	11,065
8/14		12	63,336	84	312,203	0	1,205	816	11,881
8/15		12	63,348	114	312,317	0	1,205	1,086	12,967
8/16		-6	63,342	144	312,461	0	1,205	1,086	14,053
8/17		0	63,342	62	312,523	0	1,205	845	14,898
8/18		12	63,354	6	312,529	0	1,205	756	15,654
8/19		-6	63,348	-12	312,517	0	1,205	444	16,098
8/20		0	63,348	-12	312,505	0	1,205	414	16,512
8/21		0	63,348	-21	312,484	0	1,205	308	16,820
8/22		0	63,348	-10	312,474	0	1,205	183	17,003
8/23		0	63,348	6	312,480	0	1,205	115	17,118
8/24		0	63,348	0	312,480	0	1,205	113	17,231
8/25		0	63,348	12	312,492	0	1,205	83	17,314
8/26		0	63,348	0	312,492	0	1,205	126	17,440
8/27		0	63,348	0	312,492	0	1,205	201	17,641
8/28		0	63,348	6	312,498	0	1,205	204	17,845
8/29		0	63,348	0	312,498	0	1,205	232	18,077
8/30		0	63,348	0	312,498	0	1,205	168	18,245
8/31		0	63,348	0	312,498	0	1,205	33	18,278
Total	[b]	63,348		312,498		1,205		18,278	

Note: Quartiles are not shown because the entire run was not fully monitored. Dates in italics indicate days when some portion of the day's count was interpolated.

[a] Daily counts are from Side A only.

[b] Interpolation of missed counts were completed for Side A only therefore escapement estimate is considered a minimum.

Appendix G2.–Fish River tower water temperature (Temp.) and stream stage (Depth) observations, Norton Sound, 2014.

	2014	
Date	Temp. (°C)	Depth (cm)
6/18	11.0	80.8
6/19	10.0	67.1
6/20	12.0	64.3
6/21	11.0	58.5
6/22	13.0	60.4
6/23	13.0	57.3
6/24	13.0	54.9
6/25	12.0	50.6
6/26	10.0	42.1
6/27	13.0	38.4
6/28	13.5	43.3
6/29	12.0	38.4
6/30	12.0	32.3
7/01	13.5	27.4
7/02	12.0	26.8
7/03	12.0	32.3
7/04	12.0	31.1
7/05	13.0	25.0
7/06	16.0	24.4
7/07	17.0	25.0
7/08	17.0	25.6
7/09	17.0	27.4
7/10	15.0	25.0
7/11	16.0	28.7
7/12	15.0	49.4
7/13	15.0	59.1
7/14	13.0	73.2
7/15	ND	189.0
7/16	ND	ND
7/17	ND	ND
7/18	ND	ND
7/19	ND	ND
7/20	ND	ND
7/21	ND	ND
7/22	ND	ND
7/23	ND	ND
7/24	ND	ND
7/25	ND	ND
7/26	15.0	84.1
7/27	17.0	76.2

-continued-

	2014	
Date	Temp. (°C)	Depth (cm)
7/28	16.0	72.5
7/29	16.0	70.1
7/30	17.0	64.0
7/31	18.0	59.7
8/01	18.0	60.4
8/02	18.0	59.1
8/03	19.0	55.5
8/04	20.0	52.4
8/05	20.0	49.4
8/06	20.0	46.3
8/07	20.0	45.7
8/08	20.0	45.1
8/09	13.0	48.8
8/10	15.0	45.1
8/11	14.0	40.8
8/12	14.0	42.1
8/13	13.0	51.2
8/14	12.5	51.8
8/15	11.5	54.9
8/16	12.0	70.1
8/17	11.0	100.6
8/18	12.0	97.5
8/19	ND	82.3
8/20	11.0	76.2
8/21	ND	64.0
8/22	9.5	62.2
8/23	9.5	57.9
8/24	10.0	54.9
8/25	10.0	51.8
8/26	10.0	48.8
8/27	12.0	46.9
8/28	10.0	46.9
8/29	8.0	46.9
8/30	7.0	45.1
8/31	7.0	43.9

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.

APPENDIX H: KWINIUK RIVER TOWER

Appendix H1.–Expanded daily and cumulative (Cum.) migration of all salmonid species past Kwiniuk River counting tower, Norton Sound, 2013.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
6/24	9	9	-18	-18	0	0	0	0
6/25	0	9	3	-15	0	0	0	0
6/26	-30	-21	3	-12	0	0	0	0
6/27	486	465	0	-12	6	6	0	0
6/28	111	576	0	-12	0	6	0	0
6/29	0	576	0	-12	0	6	0	0
6/30	120	696	6	-6	0	6	0	0
7/01	228	924	60	54	6	12	0	0
7/02	48	972	15	69	0	12	0	0
7/03	-18	954	-3	66	0	12	0	0
7/04	-21	933	21	87	-3	9	0	0
7/05	84	1,017	33	120	0	9	0	0
7/06	75	1,092	12	132	0	9	0	0
7/07	363	1,455	138	270	0	9	0	0
7/08	12	1,467	18	288	0	9	0	0
7/09	171	1,638	18	306	0	9	0	0
7/10	765	2,403	201	507	0	9	0	0
7/11	711	3,114	330	837	0	9	0	0
7/12	27	3,141	18	855	0	9	0	0
7/13	780	3,921	225	1,080	0	9	0	0
7/14	654	4,575	390	1,470	0	9	0	0
7/15	21	4,596	81	1,551	0	9	0	0
7/16	174	4,770	105	1,656	0	9	0	0
7/17	78	4,848	285	1,941	0	9	0	0
7/18	213	5,061	315	2,256	0	9	0	0
7/19	198	5,259	822	3,078	0	9	0	0
7/20	27	5,286	237	3,315	0	9	3	3
7/21	18	5,304	294	3,609	0	9	3	6
7/22	54	5,358	666	4,275	0	9	0	6
7/23	54	5,412	666	4,941	0	9	3	9
7/24	39	5,451	1,494	6,435	6	15	3	12
7/25	24	5,475	411	6,846	0	15	0	12
7/26	21	5,496	1,071	7,917	0	15	18	30
7/27	24	5,520	945	8,862	0	15	27	57
7/28	15	5,535	483	9,345	0	15	57	114
7/29	12	5,547	843	10,188	0	15	63	177
7/30	9	5,556	333	10,521	0	15	54	231
7/31	12	5,568	417	10,938	0	15	21	252
8/01	36	5,604	357	11,295	0	15	123	375
8/02	6	5,610	252	11,547	0	15	186	561
8/03	3	5,613	357	11,904	0	15	105	666
8/04	3	5,616	171	12,075	0	15	6	672
8/05	3	5,619	165	12,240	0	15	96	768
8/06	0	5,619	159	12,399	0	15	45	813
8/07	3	5,622	183	12,582	0	15	96	909
8/08	0	5,622	225	12,807	0	15	279	1,188
8/09	0	5,622	42	12,849	0	15	81	1,269
8/10	0	5,622	120	12,969	0	15	177	1,446

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
8/11	0	5,622	81	13,050	0	15	243	1,689
8/12	0	5,622	18	13,068	0	15	-6	1,683
8/13	0	5,622	18	13,086	0	15	108	1,791
8/14	0	5,622	21	13,107	0	15	63	1,854
8/15	0	5,622	0	13,107	0	15	84	1,938
8/16	0	5,622	30	13,137	0	15	180	2,118
8/17	0	5,622	6	13,143	0	15	75	2,193
8/18	0	5,622	24	13,167	0	15	66	2,259
8/19	0	5,622	12	13,179	0	15	435	2,694
8/20	0	5,622	0	13,179	0	15	27	2,721
8/21	3	5,625	3	13,182	0	15	3	2,724
8/22	0	5,625	3	13,185	0	15	93	2,817
8/23	0	5,625	3	13,188	0	15	117	2,934
8/24	0	5,625	0	13,188	0	15	-48	2,886
8/25	0	5,625	6	13,194	0	15	63	2,949
8/26	0	5,625	9	13,203	0	15	213	3,162
8/27	0	5,625	3	13,206	0	15	63	3,225
8/28	0	5,625	6	13,212	0	15	-15	3,210
8/29	0	5,625	0	13,212	0	15	72	3,282
8/30	0	5,625	0	13,212	0	15	-12	3,270
8/31	0	5,625	0	13,212	0	15	-36	3,234
9/01	0	5,625	0	13,212	0	15	21	3,255
9/02	0	5,625	0	13,212	0	15	96	3,351
9/03	0	5,625	0	13,212	0	15	231	3,582
9/04	0	5,625	0	13,212	0	15	54	3,636
9/05	0	5,625	0	13,212	0	15	6	3,642
9/06	0	5,625	0	13,212	0	15	3	3,645
9/07	0	5,625	0	13,212	0	15	12	3,657
9/08	0	5,625	0	13,212	0	15	-63	3,594
9/09	0	5,625	0	13,212	0	15	9	3,603
9/10	0	5,625	0	13,212	0	15	84	3,687
9/11	0	5,625	0	13,212	0	15	42	3,729
Total	5,625		13,212		15		3,729	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix H2.–Expanded daily and cumulative (Cum.) migration of all salmonid species past Kwiniuk River counting tower, Norton Sound, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
6/15	15	15	21	21	0	0	0	0
6/16	9	24	-24	-3	0	0	0	0
6/17	9	33	12	9	0	0	0	0
6/18	9	42	24	33	0	0	0	0
6/19	63	105	18	51	0	0	0	0
6/20	327	432	165	216	0	0	0	0
6/21	72	504	105	321	0	0	0	0
6/22	78	582	72	393	0	0	0	0
6/23	1,896	2,478	468	861	0	0	0	0
6/24	825	3,303	432	1,293	0	0	0	0
6/25	2,577	5,880	1,416	2,709	12	12	0	0
6/26	762	6,642	585	3,294	9	21	0	0
6/27	4,878	11,520	7,206	10,500	81	102	0	0
6/28	243	11,763	324	10,824	12	114	0	0
6/29	6	11,769	0	10,824	0	114	0	0
6/30	585	12,354	309	11,133	15	129	0	0
7/01	2,055	14,409	2,100	13,233	24	153	0	0
7/02	249	14,658	207	13,440	-9	144	0	0
7/03	1,713	16,371	978	14,418	12	156	0	0
7/04	3,987	20,358	7,005	21,423	27	183	0	0
7/05	1,443	21,801	21,309	42,732	42	225	0	0
7/06	3,330	25,131	59,352	102,084	90	315	0	0
7/07	1,365	26,496	42,816	144,900	21	336	0	0
7/08	1,032	27,528	16,365	161,265	3	339	0	0
7/09	822	28,350	16,788	178,053	12	351	0	0
7/10	474	28,824	6,834	184,887	3	354	0	0
7/11	387	29,211	4,716	189,603	6	360	0	0
7/12	1,395	30,606	8,496	198,099	15	375	0	0
7/13	2,490	33,096	17,277	215,376	24	399	0	0
7/14	-21	33,075	-2,568	212,808	-3	396	0	0
7/15	762	33,837	3,891	216,699	3	399	0	0
7/16	36	33,873	1,374	218,073	3	402	0	0
7/17	141	34,014	1,851	219,924	0	402	3	3
7/18	204	34,218	4,101	224,025	3	405	9	12
7/19	393	34,611	7,800	231,825	3	408	27	39
7/20	240	34,851	9,183	241,008	0	408	15	54
7/21	1,044	35,895	12,741	253,749	3	411	90	144
7/22	828	36,723	17,604	271,353	0	411	66	210
7/23	75	36,798	3,804	275,157	0	411	12	222
7/24	456	37,254	11,937	287,094	0	411	57	279
7/25	276	37,530	5,805	292,899	0	411	12	291
7/26	579	38,109	7,737	300,636	0	411	27	318
7/27	600	38,709	6,852	307,488	6	417	66	384
7/28	114	38,823	3,456	310,944	3	420	24	408
7/29	438	39,261	3,885	314,829	0	420	78	486
7/30	246	39,507	3,309	318,138	3	423	99	585
7/31	33	39,540	924	319,062	3	426	63	648
8/01	27	39,567	759	319,821	3	429	81	729

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
8/02	57	39,624	591	320,412	0	429	78	807
8/03	36	39,660	498	320,910	0	429	60	867
8/04	18	39,678	459	321,369	0	429	108	975
8/05	3	39,681	369	321,738	0	429	537	1,512
8/06	21	39,702	198	321,936	0	429	204	1,716
8/07	6	39,708	102	322,038	0	429	270	1,986
8/08	6	39,714	168	322,206	3	432	555	2,541
8/09	9	39,723	78	322,284	3	435	633	3,174
8/10	0	39,723	51	322,335	3	438	1,053	4,227
8/11	0	39,723	27	322,362	-3	435	1,452	5,679
8/12	6	39,729	15	322,377	3	438	732	6,411
8/13	0	39,729	24	322,401	0	438	453	6,864
8/14	3	39,732	18	322,419	0	438	507	7,371
8/15	6	39,738	39	322,458	0	438	192	7,563
8/16	0	39,738	42	322,500	0	438	669	8,232
8/17	0	39,738	12	322,512	0	438	432	8,664
8/18	0	39,738	33	322,545	0	438	1,254	9,918
8/19	0	39,738	24	322,569	0	438	663	10,581
8/20	0	39,738	24	322,593	0	438	42	10,623
8/21	0	39,738	33	322,626	0	438	132	10,755
8/22	0	39,738	0	322,626	0	438	252	11,007
8/23	36	39,774	108	322,734	0	438	423	11,430
8/24	0	39,774	36	322,770	0	438	222	11,652
8/25	0	39,774	0	322,770	0	438	387	12,039
8/26	0	39,774	0	322,770	0	438	243	12,282
8/27	0	39,774	0	322,770	0	438	60	12,342
8/28	0	39,774	3	322,773	0	438	213	12,555
8/29	0	39,774	0	322,773	0	438	102	12,657
8/30	0	39,774	12	322,785	0	438	588	13,245
8/31	0	39,774	0	322,785	0	438	99	13,344
9/01	0	39,774	0	322,785	0	438	708	14,052
9/02	0	39,774	0	322,785	0	438	33	14,085
9/03	0	39,774	3	322,788	0	438	84	14,169
9/04	0	39,774	0	322,788	0	438	33	14,202
9/05	0	39,774	0	322,788	0	438	108	14,310
9/06	0	39,774	9	322,797	0	438	150	14,460
9/07	0	39,774	18	322,815	0	438	51	14,511
9/08	0	39,774	6	322,821	0	438	30	14,541
9/09	0	39,774	9	322,830	0	438	96	14,637
Total	39,774		322,830		438		14,637	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

Appendix H3.–Age and sex compositions by year for Kwiniuk River chum salmon ASL samples, 1995–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)						
				Male	Female	(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)
1995	6/30-7/25	341		52.0	48.0	0.0	0.0	56.0	40.0	4.0	0.0	0.0
1996	7/03-7/13	57	[a]									
1997	7/04-7/24	409		41.0	59.0	0.0	0.0	53.0	46.0	1.0	0.0	0.0
1998	6/26-7/24	499		52.0	48.0	0.0	1.0	80.0	19.0	1.0	0.0	0.0
1999	7/01-7/23	247		49.0	51.0	0.0	0.0	47.0	52.0	1.0	0.0	0.0
2000	6/28-7/27	308		43.0	57.0	0.0	0.0	87.0	13.0	0.0	0.0	0.0
2001	6/30-8/14	763		46.0	54.0	0.0	4.0	9.0	86.0	1.0	0.0	0.0
2002	6/19-7/21	484		43.0	57.0	0.0	0.0	92.0	7.0	1.0	0.0	0.0
2003	6/25-7/24	473		47.0	54.0	0.0	1.0	34.0	64.0	1.0	0.0	0.0
2004	6/23-8/02	302		43.0	57.0	0.0	4.0	65.0	29.0	2.0	0.0	0.0
2005	6/29-7/27	434		43.0	57.0	0.0	4.0	65.0	29.0	2.0	0.0	0.0
2006	6/28-7/14	474		51.0	49.0	0.0	0.5	75.0	24.0	0.5	0.0	0.0
2007	6/26-7/23	506		46.0	54.0	0.0	0.0	40.0	58.0	3.0	0.0	0.0
2008	7/01-7/10	86	[a]	60.0	40.0							
2009	7/05-7/27	214		44.0	56.0	0.0	58.0	18.0	13.0	11.0	0.0	0.0
2010	6/28-7/22	241		42.0	58.0	0.0	1.0	97.0	2.0	0.0	0.0	0.0
2011	6/24-7/23	236		42.8	57.2	0.0	0.4	33.2	66.0	0.0	0.4	0.0
2012	7/10-7/13	4	[a]									
2013	6/27-7/29	202		41.7	58.3	0.0	0.4	57.8	40.8	0.9	0.0	0.0
2014	No data collected.											

[a] Sample size insufficient for sex composition analysis.

Appendix H4.–Age and sex compositions by year for Kwiniuk River Chinook salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples	Percent by Sex		Percent by (Age Group)						
			Male	Female	(1.1)	(1.2)	(1.3)	(1.4)	(2.3)	(1.5)	(2.4)
2001			No data collected								
2002			No data collected								
2003			No data collected								
2004	8/04	5 [a]									
2005	7/08	4 [a]									
2006			No data collected								
2007			No data collected								
2008			No data collected								
2009			No data collected								
2010			No data collected								
2011			No data collected								
2012			No data collected								
2013			No data collected								
2014			No data collected								

[a] Sample size insufficient for sex composition analysis.

Appendix H5.–Age and sex compositions by year for Kwiniuk River coho salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples	Percent by Sex		Percent by (Age Group)				
			Male	Female	(1.1)	(2.1)	(2.2)	(3.1)	(4.1)
2001				No data collected					
2002	8/03-8/23	157	60.5	39.5	7.6	86.6	1.3	3.8	0.6
2003	7/21-9/08	424	50.2	49.8	24.1	64.9	0.0	11.1	0.0
2004	7/26-8/10	152	53.9	46.1	11.8	88.2	0.0	0.0	0.0
2005	7/20-8/20	154	38.3	61.7	19.5	79.9	0.0	0.6	0.0
2006	8/13-8/26	182	43.4	56.6	22.5	74.7	0.0	2.7	0.0
2007	8/15-8/23	106 [a]	54.7	45.3					
2008				No data collected					
2009				No data collected					
2010				No data collected					
2011				No data collected					
2012				No data collected					
2013				No data collected					
2014				No data collected					

[a] Sample size insufficient for sex composition analysis.

Appendix H6.–Kwiniuk River tower water temperature (Temp.) and stream stage (Depth) observations, Norton Sound, 2013–2014.

	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
6/15			8.0	5.1
6/16			7.0	35.6
6/17			10.0	31.8
6/18			9.0	41.9
6/19			8.0	29.2
6/20			10.0	25.4
6/21			10.0	25.4
6/22			11.0	25.4
6/23			10.0	33.0
6/24	12.0	8.9	10.0	43.2
6/25	12.0	7.6	10.0	26.7
6/26	14.0	5.3	10.0	27.9
6/27	14.0	20.8	11.0	29.2
6/28	14.0	13.0	12.0	29.2
6/29	12.0	21.6	9.0	21.6
6/30	14.0	80.0	8.0	22.9
7/01	13.0	69.9	10.0	17.8
7/02	10.0	61.0	9.0	30.5
7/03	8.0	72.4	8.0	20.3
7/04	8.0	62.2	11.0	17.8
7/05	8.0	69.9	10.0	17.8
7/06	8.0	64.3	13.0	17.8
7/07	9.0	53.8	14.0	34.3
7/08	10.0	43.2	12.0	33.0
7/09	10.0	43.2	12.0	43.2
7/10	7.0	41.3	10.0	25.4
7/11	12.0	25.4	11.0	20.3
7/12	12.0	24.9	10.0	19.1
7/13	12.0	21.6	11.0	24.1
7/14	12.0	40.6	9.0	95.3
7/15	12.0	33.0	8.0	59.7
7/16	12.0	35.6	8.0	74.9
7/17	10.0	40.6	8.0	71.1
7/18	12.0	47.0	7.0	50.8
7/19	12.0	61.0	8.0	68.6
7/20	12.0	45.7	7.0	49.5
7/21	10.0	44.5	6.0	80.0
7/22	12.0	40.6	7.0	43.2
7/23	14.0	22.9	9.0	49.5
7/24	14.0	17.8	7.0	33.0

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Appendix H6.–Page 2 of 3.

	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
7/25	10.0	17.3	7.0	26.7
7/26	14.0	18.3	7.0	25.4
7/27	14.0	15.7	10.0	25.4
7/28	15.0	41.9	7.0	25.4
7/29	14.0	22.9	9.0	22.9
7/30	14.0	22.9	10.0	20.3
7/31	14.0	22.9	10.0	29.2
8/01	15.0	33.0	10.0	27.9
8/02	15.0	55.9	10.0	22.9
8/03	14.0	44.5	11.0	25.4
8/04	13.0	53.3	12.0	35.6
8/05	13.0	33.5	12.0	43.2
8/06	12.0	30.5	11.0	52.1
8/07	12.0	21.3	12.0	63.5
8/08	13.0	33.3	12.0	14.0
8/09	11.0	28.4	11.0	35.6
8/10	11.0	33.5	13.0	25.4
8/11	12.0	48.3	12.0	15.2
8/12	9.0	60.2	13.0	16.5
8/13	10.0	41.1	12.0	15.2
8/14	10.0	58.7	12.0	20.3
8/15	10.0	55.9	10.0	25.4
8/16	10.0	58.7	10.0	38.1
8/17	10.0	43.7	10.0	43.2
8/18	10.0	43.4	10.0	64.8
8/19	10.0	56.1	10.0	68.6
8/20	10.0	41.1	9.0	57.2
8/21	9.0	31.0	9.0	39.4
8/22	10.0	34.0	9.0	25.4
8/23	10.0	44.5	9.0	24.1
8/24	9.0	33.5	9.0	17.8
8/25	4.0	31.8	9.0	22.9
8/26	9.0	35.6	9.0	25.4
8/27	9.0	61.0	10.0	45.7
8/28	7.0	52.1	9.0	25.4
8/29	7.0	46.7	4.0	15.2
8/30	7.0	33.8	5.0	15.2
8/31	5.0	38.1	4.0	24.1
9/01	6.0	27.9	6.0	108.0
9/02	8.0	23.4	5.0	67.3
9/03	8.0	71.1	3.0	57.2
9/04	7.0	50.8	3.0	38.1
9/05	6.0	53.3	3.0	20.3

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	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
9/06	6.0	62.7	3.0	26.7
9/07	6.0	61.0	3.0	20.3
9/08	6.0	50.8	3.0	17.8
9/09	5.0	43.2	8.0	20.3
9/10	6.0	40.6		
9/11	8.0	40.6		

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.

APPENDIX I: INGLUTALIK RIVER TOWER

Appendix I1.–Expanded daily and cumulative (Cum.) migration of all salmonid species past Inglutalik River tower, Norton Sound, 2013.

Date		Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook		Cum. Chinook	Daily Coho		Cum. Coho
6/21	a	15	15	0	0	0		0	0		0
6/22	a	24	39	0	0	3		3	0		0
6/23	a	39	78	0	0	0		3	0		0
6/24	a	192	270	0	0	3		6	0		0
6/25	a	-3	267	0	0	186		192	0		0
6/26	a	183	450	0	0	210		402	0		0
6/27	a	-144	306	9	9	-93		309	0		0
6/28	a	144	450	246	255	81		390	0		0
6/29	a	-21	429	-207	48	-18		372	0		0
6/30	a	648	1,077	0	48	1,518	b	1,890	0		0
7/01	a	306	1,383	3	51	1,281	b	3,171	0		0
7/02	a	-57	1,326	36	87	-315		2,856	0		0
7/03	a	1,263	2,589	0	87	15		2,871	0		0
7/04		1,062	3,651	39	126	0		2,871	0		0
7/05	a	105	3,756	9	135	-6		2,865	0		0
7/06		1,536	5,292	42	177	75		2,940	0		0
7/07		531	5,823	270	447	108		3,048	0		0
7/08		-3,456	2,367	66	513	-24		3,024	0		0
7/09		3,390	5,757	111	624	114		3,138	0		0
7/10		402	6,159	63	687	6		3,144	0		0
7/11		537	6,696	210	897	3		3,147	0		0
7/12		6,477	13,173	417	1,314	90		3,237	0		0
7/13		4,449	17,622	6,603	7,917	-3		3,234	0		0
7/14		13,056	30,678	19,737	27,654	156		3,390	0		0
7/15		5,535	36,213	8,877	36,531	30		3,420	0		0
7/16		1,335	37,548	1,008	37,539	0		3,420	0		0
7/17		-6	37,542	-912	36,627	-3		3,417	0		0
7/18		4,587	42,129	12,810	49,437	-6		3,411	0		0
7/19	a	2,061	44,190	1,185	50,622	0		3,411	0		0
7/20			44,190		50,622			3,411			0
7/21			44,190		50,622			3,411			0
7/22			44,190		50,622			3,411			0
7/23	a	1,530	45,720	3,846	54,468	-3		3,408	0		0
7/24	a	636	46,356	16,854	71,322	0		3,408	1,590	c	1,590
7/25		861	47,217	8,310	79,632	0		3,408	369	c	1,959
7/26	a	777	47,994	17,352	96,984	0		3,408	306	c	2,265
7/27	a	360	48,354	15,165	112,149	0		3,408	330	c	2,595
7/28	a	510	48,864	16,395	128,544	0		3,408	1,011	c	3,606
7/29		228	49,092	7,437	135,981	0		3,408	90		3,696
7/30	a	102	49,194	1,824	137,805	3		3,411	18		3,714
7/31	a	615	49,809	27,339	165,144	0		3,411	42		3,756
8/01	a	561	50,370	22,875	188,019	0		3,411	54		3,810
8/02		282	50,652	5,163	193,182	0		3,411	162		3,972
8/03		261	50,913	3,822	197,004	0		3,411	102		4,074
8/04	a	-48	50,865	468	197,472	0		3,411	51		4,125
8/05		165	51,030	645	198,117	0		3,411	72		4,197
8/06	a	51	51,081	243	198,360	0		3,411	54		4,251
8/07	a	-9	51,072	720	199,080	0		3,411	45		4,296

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Date		Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
8/08	[a]	27	51,099	1,782	200,862	0	3,411	60	4,356
8/09	[a]	15	51,114	42	200,904	0	3,411	54	4,410
8/10	[a]	-6	51,108	231	201,135	0	3,411	48	4,458
8/11	[a]	-9	51,099	303	201,438	0	3,411	30	4,488
Total		51,099		201,438		3,411		4,488	

Note: Quartiles are not shown because the target operational period of the project was not fully monitored. Dates in italics indicate days when the tower was not operational due to high water. Interpolation was not completed because a diurnal pattern could not be established.

[a] Partial day count. Interpolation was not completed because a diurnal pattern could not be established.

[b] Low counts from aerial surveys indicate these numbers may not be accurate.

[c] These counts are unreliable and are believed to be late chum salmon identified as coho salmon.

Appendix I2.–Expanded daily and cumulative (Cum.) migration of all salmonid species past Inglutalik River tower, Norton Sound, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
6/20	6	6	0	0	6	6	0	0
6/21	375	381	36	36	9	15	0	0
6/22	1,077	1,458	27	63	66	81	0	0
6/23	12	1,470	9	72	15	96	0	0
6/24	816	2,286	75	147	60	156	0	0
6/25	177	2,463	111	258	39	195	0	0
6/26	864	3,327	1,521	1,779	123	318	0	0
6/27	2,467	5,794	1,530	3,309	75	393	0	0
6/28	921	6,715	407	3,716	158	551	0	0
6/29	1,620	8,335	723	4,439	117	668	0	0
6/30	981	9,316	198	4,637	60	728	0	0
7/01	5,442	14,758	1,620	6,257	327	1,055	0	0
7/02	1,938	16,696	2,187	8,444	132	1,187	0	0
7/03	3,063	19,759	1,110	9,554	108	1,295	0	0
7/04	3,693	23,452	6,630	16,184	120	1,415	0	0
7/05	7,260	30,712	5,991	22,175	96	1,511	0	0
7/06	16,584	47,296	12,324	34,499	87	1,598	0	0
7/07	5,172	52,468	10,374	44,873	39	1,637	0	0
7/08	4,281	56,749	8,028	52,901	0	1,637	3	3
7/09	1,567	58,316	2,218	55,119	6	1,643	63	66
7/10	1,707	60,023	4,428	59,547	21	1,664	408	474
7/11	288	60,311	621	60,168	12	1,676	423	897
7/12	1,842	62,153	1,584	61,752	0	1,676	81	978
Total	62,153		61,725		1,676		978	

Note: Quartiles are not shown because the target operational period of the project was not fully monitored. Dates in italics indicate days when some portion of the day's count was interpolated.

Appendix I3.–Age and sex compositions by year for Inglutalik River chum salmon ASL samples, 2011–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)						
				Male	Female	(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)
2011	7/09-8/10	131	[a]	40.7	59.3							
2012	7/09-7/25	56	[a]									
2013	7/07-7/18	144	[a]	54.1	45.9							
2014	No data collected											

[a] Sample size insufficient for sex composition analysis.

Appendix I4.–Inglutalik River tower water temperature (Temp.) and stream stage (Depth) observations, Norton Sound, 2013–2014.

	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
6/20				
6/21			18	ND
6/22			12	ND
6/23			13	ND
6/24			13	ND
6/25			12	ND
6/26			13	ND
6/27			14	ND
6/28	15	ND	14	ND
6/29	14	ND	14	ND
6/30	ND	ND	13	ND
7/01	ND	ND	15	ND
7/02	ND	ND	12	ND
7/03	ND	ND	12	ND
7/04	12	ND	13	ND
7/05	11	ND	14	ND
7/06	11.5	ND	17	ND
7/07	13	ND	12	ND
7/08	13	ND	17	ND
7/09	12	ND	16	ND
7/10	12	ND	ND	ND
7/11	11	ND	ND	ND
7/12	16	ND	ND	ND
7/13	20	ND		
7/14	18	ND		
7/15	16	ND		
7/16	14.5	ND		
7/17	14	ND		
7/18	14	ND		
7/19	14.5	ND		
7/20	ND	ND		
7/21	ND	ND		
7/22	ND	ND		
7/23	12	ND		
7/24	12	ND		
7/25	12	ND		
7/26	14	ND		
7/27	13	ND		
7/28	16	ND		
7/29	15	ND		

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	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
7/30	ND	ND		
7/31	14	ND		
8/01	16	ND		
8/02	15	ND		
8/03	ND	ND		
8/04	15	ND		
8/05	12	ND		
8/06	13	ND		
8/07	13	ND		
8/08	ND	ND		
8/09	13	ND		
8/10	12	ND		

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.

APPENDIX J: NORTH RIVER TOWER

Appendix J1.–Expanded daily and cumulative (Cum.) migration of all salmonid species past North River tower, Norton Sound, 2013.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
6/21	0	0	50	50	0	0	0	0
6/22	0	0	22	72	0	0	0	0
6/23	0	0	78	150	0	0	0	0
6/24	0	0	0	150	0	0	0	0
6/25	0	0	0	150	0	0	0	0
6/26	12	12	24	174	6	0	0	0
6/27	0	12	12	186	0	6	0	0
6/28	6	18	24	210	12	6	0	0
6/29	0	18	6	216	0	18	0	0
6/30	72	90	0	216	6	18	0	0
7/01	76	166	0	216	0	24	0	0
7/02	55	221	0	216	0	24	0	0
7/03	33	254	0	216	0	24	0	0
7/04	0	254	0	216	0	24	0	0
7/05	41	295	0	216	0	24	0	0
7/06	50	345	0	216	0	24	0	0
7/07	90	435	18	234	0	24	0	0
7/08	58	493	103	337	0	24	0	0
7/09	246	739	655	992	11	24	0	0
7/10	434	1,173	1,205	2,197	22	35	0	0
7/11	102	1,275	522	2,719	18	57	0	0
7/12	264	1,539	618	3,337	0	75	0	0
7/13	564	2,103	1,854	5,191	18	75	0	0
7/14	966	3,069	4,764	9,955	48	93	0	0
7/15	396	3,465	3,786	13,741	42	141	0	0
7/16	138	3,603	1,998	15,739	84	183	0	0
7/17	108	3,711	1,800	17,539	18	267	0	0
7/18	114	3,825	1,836	19,375	6	285	0	0
7/19	108	3,933	1,944	21,319	48	291	6	6
7/20	210	4,143	1,788	23,107	36	339	36	42
7/21	234	4,377	2,466	25,573	18	375	36	78
7/22	246	4,623	3,738	29,311	24	393	54	132
7/23	450	5,073	3,234	32,545	12	417	12	144
7/24	192	5,265	2,022	34,567	18	429	6	150
7/25	270	5,535	1,530	36,097	18	447	48	198
7/26	132	5,667	1,818	37,915	24	465	66	264
7/27	198	5,865	1,350	39,265	7	489	190	454
7/28	372	6,237	1,362	40,627	18	496	114	568
7/29	138	6,375	828	41,455	24	514	102	670
7/30	366	6,741	1,032	42,487	6	538	78	748
7/31	540	7,281	1,056	43,543	12	544	132	880
8/01	234	7,515	510	44,053	12	556	312	1,192
8/02	126	7,641	792	44,845	0	568	378	1,570
8/03	162	7,803	900	45,745	6	568	60	1,630
8/04	120	7,923	636	46,381	0	574	138	1,768
8/05	90	8,013	354	46,735	0	574	234	2,002
8/06	66	8,079	264	46,999	0	574	90	2,092
8/07	306	8,385	252	47,251	0	574	54	2,146

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
8/08	300	8,685	222	47,473	0	574	336	2,482
8/09	174	8,859	102	47,575	0	574	30	2,512
8/10	288	9,147	54	47,629	0	574	222	2,734
8/11	384	9,531	180	47,809	0	574	186	2,920
8/12	126	9,657	66	47,875	6	574	198	3,118
8/13	222	9,879	48	47,923	0	580	240	3,358
8/14	180	10,059	66	47,989	0	580	378	3,736
8/15	156	10,215	6	47,995	0	580	282	4,018
8/16	54	10,269	6	48,001	0	580	42	4,060
8/17	168	10,437	6	48,007	0	580	354	4,414
8/18	84	10,521	-6	48,001	0	580	234	4,648
8/19	112	10,633	0	48,001	0	580	317	4,965
8/20	72	10,705	18	48,019	0	580	438	5,403
8/21	60	10,765	12	48,031	0	580	342	5,745
8/22	96	10,861	12	48,043	0	580	312	6,057
8/23	120	10,981	0	48,043	0	580	1,248	7,305
8/24	43	11,024	9	48,052	0	580	104	7,409
8/25	48	11,072	6	48,058	0	580	84	7,493
8/26	24	11,096	6	48,064	0	580	156	7,649
8/27	43	11,139	0	48,064	0	580	212	7,861
8/28	-12	11,127	18	48,082	0	580	516	8,377
8/29	56	11,183	9	48,091	0	580	199	8,576
8/30	24	11,207	0	48,091	0	580	83	8,659
8/31	0	11,207	6	48,097	0	580	0	8,659
9/01	-18	11,189	0	48,097	0	580	162	8,821
9/02	12	11,201	0	48,097	0	580	294	9,115
Total	11,201		48,097		580		9,115	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile. Dates in italics indicate days when some portion of the day's count was interpolated.

Appendix J2.–Expanded daily and cumulative (Cum.) migration of all salmonid species past North River tower, Norton Sound, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
6/14	0	0	0	0	0		0	0
6/15	0	0	0	0	0	0	0	0
6/16	0	0	0	0	0	0	0	0
6/17	0	0	0	0	0	0	0	0
6/18	0	0	0	0	0	0	0	0
6/19	0	0	0	0	0	0	0	0
6/20	0	0	0	0	0	0	0	0
6/21	0	0	54	54	0	0	0	0
6/22	6	6	102	156	0	0	0	0
6/23	0	6	6	162	0	0	0	0
6/24	0	6	6	168	0	0	0	0
6/25	0	6	42	210	0	0	0	0
6/26	60	66	48	258	0	0	0	0
6/27	66	132	366	624	0	0	0	0
6/28	42	174	558	1,182	12	12	0	0
6/29	-24	150	90	1,272	0	12	0	0
6/30	120	270	2,052	3,324	6	18	0	0
7/01	72	342	1,008	4,332	6	24	0	0
7/02	18	360	1,428	5,760	12	36	0	0
7/03	204	564	3,882	9,642	72	108	0	0
7/04	522	1,086	6,936	16,578	30	138	0	0
7/05	1,050	2,136	14,580	31,158	756	894	0	0
7/06	1,398	3,534	31,116	62,274	324	1,218	0	0
7/07	234	3,768	11,796	74,070	162	1,380	0	0
7/08	144	3,912	6,738	80,808	54	1,434	0	0
7/09	270	4,182	12,714	93,522	120	1,554	0	0
7/10	198	4,380	7,254	100,776	126	1,680	0	0
7/11	78	4,458	2,916	103,692	12	1,692	0	0
7/12	534	4,992	10,968	114,660	126	1,818	0	0
7/13	2,156	7,148	32,973	147,633	434	2,252	0	0
7/14	530	7,678	11,303	158,936	171	2,423	4	4
7/15	535	8,213	11,231	170,167	170	2,593	15	19
7/16	525	8,738	11,039	181,206	165	2,758	19	38
7/17	488	9,226	10,575	191,781	163	2,921	23	61
7/18	413	9,639	9,515	201,296	104	3,025	28	89
7/19	307	9,946	7,161	208,457	79	3,104	32	121
7/20	292	10,238	6,289	214,746	68	3,172	40	161
7/21	286	10,524	5,787	220,533	64	3,236	45	206
7/22	267	10,791	4,818	225,351	55	3,291	47	253
7/23	266	11,057	4,280	229,631	46	3,337	58	311
7/24	265	11,322	4,065	233,696	45	3,382	64	375
7/25	240	11,562	3,223	236,919	36	3,418	76	451
7/26	87	11,649	3,644	240,563	0	3,418	51	502
7/27	85	11,734	481	241,044	0	3,418	138	640
7/28	62	11,796	1,389	242,433	0	3,418	50	690
7/29	48	11,844	912	243,345	0	3,418	66	756
7/30	66	11,910	792	244,137	0	3,418	54	810
7/31	24	11,934	510	244,647	0	3,418	54	864

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho
8/01	42	11,976	462	245,109	0	3,418	102	966
8/02	72	12,048	216	245,325	18	3,436	60	1,026
8/03	18	12,066	120	245,445	6	3,442	42	1,068
8/04	186	12,252	252	245,697	0	3,442	126	1,194
8/05	60	12,312	132	245,829	0	3,442	96	1,290
8/06	210	12,522	24	245,853	6	3,448	150	1,440
8/07	174	12,696	42	245,895	0	3,448	96	1,536
8/08	84	12,780	12	245,907	0	3,448	48	1,584
8/09	66	12,846	78	245,985	0	3,448	12	1,596
8/10	126	12,972	24	246,009	0	3,448	66	1,662
8/11	120	13,092	18	246,027	0	3,448	138	1,800
8/12	114	13,206	12	246,039	0	3,448	186	1,986
8/13	42	13,248	24	246,063	6	3,454	102	2,088
8/14	48	13,296	0	246,063	0	3,454	216	2,304
8/15	72	13,368	12	246,075	0	3,454	264	2,568
8/16	66	13,434	0	246,075	0	3,454	126	2,694
8/17	48	13,482	0	246,075	0	3,454	48	2,742
8/18	36	13,518	0	246,075	0	3,454	42	2,784
8/19	42	13,560	0	246,075	0	3,454	72	2,856
8/20	30	13,590	0	246,075	0	3,454	198	3,054
8/21	60	13,650	0	246,075	0	3,454	216	3,270
8/22	18	13,668	0	246,075	0	3,454	42	3,312
8/23	12	13,680	0	246,075	0	3,454	132	3,444
8/24	30	13,710	0	246,075	0	3,454	144	3,588
8/25	30	13,740	0	246,075	0	3,454	264	3,852
8/26	60	13,800	0	246,075	0	3,454	150	4,002
8/27	42	13,842	0	246,075	0	3,454	552	4,554
8/28	13	13,855	0	246,075	0	3,454	265	4,819
8/29	0	13,855	0	246,075	0	3,454	54	4,873
8/30	9	13,864	0	246,075	0	3,454	0	4,873
8/31	8	13,872	0	246,075	0	3,454	98	4,971
9/01	0	13,872	0	246,075	0	3,454	24	4,995
Total	13,872		246,075		3,454		4,995	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile. Dates in italics indicate days when some portion of the day's count was interpolated.

Appendix J3.–Age and sex compositions by year for North River chum salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)						
				Male	Female	(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)
2001					No data collected							
2002					No data collected							
2003					No data collected							
2004					No data collected							
2005					No data collected							
2006					No data collected							
2007					No data collected							
2008					No data collected							
2009					No data collected							
2010					No data collected							
2011	7/10-8/08	200		57.6	42.4	0.0	0.0	35.9	63.1	0.5	0.5	0.0
2012	7/21-8/14	116	[a]	47.3	52.7							
2013	7/12-8/05	3	[a]									
2014					No data collected							

[a] Sample size insufficient for age composition analysis.

Appendix J4.–Age and sex compositions by year for North River Chinook salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples		Percent by Sex		Percent by (Age Group)						
				Male	Female	(1.1)	(1.2)	(1.3)	(1.4)	(2.3)	(1.5)	(2.4)
2001					No data collected							
2002					No data collected							
2003					No data collected							
2004					No data collected							
2005					No data collected							
2006					No data collected							
2007					No data collected							
2008					No data collected							
2009					No data collected							
2010					No data collected							
2011	7/08-8/11	142		88.9	11.1	5.6	69.1	18.5	6.8	0.0	0.0	0.0
2012					No data collected							
2013	7/12-8/05	69	[a]	79.2	20.8							
2014	7/07-7/18	61	[a]									

[a] Sample size insufficient for age composition analysis.

Appendix J5.–Age and sex compositions by year for North River coho salmon ASL samples, 2001–2014.

Year	Sampling Dates	Number of Samples	Percent by Sex		Percent by (Age Group)				
			Male	Female	(1.1)	(2.1)	(2.2)	(3.1)	(4.1)
2001			No data collected						
2002			No data collected						
2003			No data collected						
2004			No data collected						
2005			No data collected						
2006			No data collected						
2007			No data collected						
2008			No data collected						
2009			No data collected						
2010			No data collected						
2011			No data collected						
2012	8/14	14 [a]							
2013			No data collected						
2014			No data collected						

[a] Sample size insufficient for age composition analysis.

Appendix J6.–North River tower water temperature (Temp.) and stream stage (Depth) observations, Norton Sound, 2013–2014.

	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
6/15			7.0	94.0
6/16			7.0	91.4
6/17			7.0	94.0
6/18			8.0	95.3
6/19			9.0	91.4
6/20			8.0	86.4
6/21			9.0	86.4
6/22			11.0	81.3
6/23			9.0	81.3
6/24	13.0	36.8	10.0	78.7
6/25	13.0	35.6	9.0	76.2
6/26	15.0	36.8	11.0	73.7
6/27	14.0	40.6	12.0	71.1
6/28	12.0	38.1	12.0	68.6
6/29	13.0	35.6	9.0	68.6
6/30	13.0	48.3	9.0	66.0
7/01	12.0	68.6	9.0	63.5
7/02	12.0	73.7	10.0	62.2
7/03	11.0	76.2	11.0	61.0
7/04	9.0	100.3	12.0	57.2
7/05	ND	120.7	11.0	55.9
7/06	ND	ND	14.0	53.3
7/07	9.0	91.4	15.0	53.3
7/08	8.0	100.3	13.0	53.3
7/09	ND	ND	13.0	55.9
7/10	11.0	99.1	11.0	58.4
7/11	8.0	88.9	11.0	55.9
7/12	10.0	81.3	12.0	57.2
7/13	9.0	76.2	12.0	86.4
7/14	11.0	71.1	ND	ND
7/15	11.0	73.7	ND	ND
7/16	9.0	81.3	ND	ND
7/17	7.0	78.7	ND	ND
7/18	8.0	73.7	ND	ND
7/19	8.0	78.7	ND	ND
7/20	7.0	81.3	ND	ND
7/21	8.0	78.7	ND	ND
7/22	9.0	76.2	ND	ND
7/23	9.0	73.7	ND	ND
7/24	8.0	71.1	ND	ND
7/25	10.0	71.1	ND	ND
7/26	10.0	68.6	8.0	119.4
7/27	10.0	66.0	8.0	114.3
7/28	12.0	63.5	7.0	115.6
7/29	11.0	62.2	7.0	110.5
7/30	10.0	61.0	8.0	101.6
7/31	12.0	58.4	9.0	97.8
8/01	15.0	57.2	9.0	99.1
8/02	14.0	55.9	9.0	96.5

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	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
8/03	12.0	55.9	11.0	91.4
8/04	11.0	64.8	10.0	91.4
8/05	11.0	66.0	10.0	91.4
8/06	11.0	63.5	9.0	94.0
8/07	10.0	62.2	10.0	88.9
8/08	10.0	61.0	10.0	86.4
8/09	11.0	62.2	9.0	83.8
8/10	10.0	64.8	11.0	78.7
8/11	10.0	63.5	12.0	78.7
8/12	9.0	64.8	11.5	78.7
8/13	9.0	63.5	11.0	76.2
8/14	12.0	67.3	12.0	73.7
8/15	9.0	66.0	12.0	81.3
8/16	9.0	63.5	9.0	81.3
8/17	8.0	63.5	11.0	74.9
8/18	6.0	61.0	10.0	86.4
8/19	9.0	64.8	9.0	88.9
8/20	9.0	66.0	9.0	87.6
8/21	9.0	61.0	9.0	86.4
8/22	10.0	62.2	8.0	83.8
8/23	10.0	76.2	8.0	82.6
8/24	9.0	73.7	8.0	81.3
8/25	8.0	69.9	8.0	78.7
8/26	9.0	68.6	8.0	78.7
8/27	8.0	68.6	9.0	86.4
8/28	8.0	88.9	9.0	101.6
8/29	8.0	83.8	6.0	104.1
8/30	7.0	76.2	5.0	96.5
8/31	6.0	71.1	5.0	96.5
9/01	6.0	72.4		
9/02	6.0	96.5		

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.

APPENDIX K: UNALAKLEET RIVER WEIR

Appendix K1.–Daily and cumulative (Cum.) migration of all salmonid species past the Unalakleet River weir, Norton Sound, 2013.

Date		Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
6/20		22	22	0	0	0	0	0	0	0	0
6/21		10	32	2	2	1	1	0	0	0	0
6/22		10	42	1	3	0	1	0	0	0	0
6/23		2	44	2	5	0	1	0	0	0	0
6/24		22	66	3	8	1	2	0	0	0	0
6/25		189	255	15	23	1	3	0	0	0	0
6/26		765	1,020	39	62	6	9	0	0	0	0
6/27		800	1,820	42	104	8	17	0	0	0	0
6/28		270	2,090	28	132	2	19	0	0	0	0
6/29		396	2,486	29	161	0	19	0	0	0	0
6/30		733	3,219	51	212	0	19	3	3	0	0
7/01		2,056	5,275	79	291	12	31	0	3	0	0
7/02		2,095	7,370	127	418	29	60	6	9	0	0
7/03		1,894	9,264	41	459	4	64	6	15	2	2
7/04		1,427	10,691	23	482	3	67	1	16	0	2
7/05	[a]	191	10,882	2	484	2	69	0	16	0	2
7/06	[a]	4,344	15,226	120	604	21	90	10	26	0	2
7/07		5,982	21,208	256	860	61	151	3	29	3	5
7/08		3,955	25,163	208	1,068	43	194	11	40	4	9
7/09		32	25,195	0	1,068	0	194	0	40	0	9
7/10	[a]	2,726	27,921	145	1,213	12	206	0	40	0	9
7/11		11,163	39,084	748	1,961	107	313	2	42	29	38
7/12		2,622	41,706	829	2,790	42	355	9	51	20	58
7/13		2,310	44,016	1,111	3,901	39	394	13	64	17	75
7/14		4,139	48,155	2,525	6,426	21	415	18	82	6	81
7/15		2,441	50,596	3,150	9,576	27	442	5	87	5	86
7/16		1,827	52,423	3,530	13,106	18	460	12	99	2	88
7/17		1,861	54,284	3,555	16,661	20	480	22	121	12	100
7/18		1,863	60,876	4,221	20,882	14	494	16	137	7	107
7/19		2,508	64,531	6,272	27,154	15	509	12	149	13	120
7/20		3,566	68,187	7,765	34,919	54	563	67	216	5	125
7/21		3,441	71,842	7,926	42,845	49	612	108	324	17	142
7/22		3,310	75,498	8,727	51,572	16	628	97	421	7	149
7/23		3,932	79,154	15,788	67,360	4	632	198	619	5	154
7/24		1,537	82,809	10,684	78,044	2	634	160	779	11	165
7/25		1,925	86,465	12,558	90,602	7	641	276	1,055	9	174
7/26		2,320	90,120	12,181	102,783	7	648	283	1,338	3	177
7/27		1,619	93,776	8,178	110,961	1	649	172	1,510	2	179
7/28		2,249	82,554	8,531	119,492	2	651	242	1,752	2	181
7/29		1,581	84,135	5,352	124,844	1	652	420	2,172	1	182
7/30		1,375	85,510	3,327	128,171	2	654	281	2,453	2	184
7/31		1,656	87,166	3,372	131,543	1	655	361	2,814	1	185
8/01		2,628	89,794	3,986	135,529	2	657	680	3,494	5	190
8/02		2,262	92,056	2,512	138,041	0	657	611	4,105	5	195
8/03		974	93,030	973	139,014	0	657	345	4,450	2	197
8/04		983	94,013	808	139,822	0	657	656	5,106	6	203
8/05		765	94,778	479	140,301	0	657	636	5,742	1	204
8/06		605	95,383	387	140,688	1	658	444	6,186	0	204
8/07		893	96,276	432	141,120	0	658	696	6,882	1	205

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/08	1,379	97,655	589	141,709	1	659	1,149	8,031	0	205
8/09	797	98,452	334	142,043	0	659	1,234	9,265	1	206
8/10	733	99,185	191	142,234	1	660	1,190	10,455	0	206
8/11	844	100,029	169	142,403	0	660	1,462	11,917	1	207
8/12	736	100,765	126	142,529	0	660	1,796	13,713	2	209
8/13	675	101,440	112	142,641	1	661	1,082	14,795	2	211
8/14	1,314	102,754	222	142,863	0	661	2,734	17,529	0	211
8/15	414	103,168	83	142,946	1	662	989	18,518	1	212
8/16	487	103,655	39	142,985	0	662	790	19,308	0	212
8/17	732	104,387	71	143,056	1	663	942	20,250	1	213
8/18	577	104,964	74	143,130	1	664	986	21,236	0	213
8/19	625	105,589	30	143,160	0	664	1,228	22,464	1	214
8/20	439	106,028	39	143,199	0	664	1,483	23,947	2	216
8/21	320	106,348	35	143,234	1	665	617	24,564	0	216
8/22	367	106,715	16	143,250	2	667	986	25,550	1	217
Total	106,715		143,250		667		25,550		217	

Note: The inside box in the cumulative column is the midpoint of the total; the outside box starts on the first quartile and ends on the third quartile.

[a] Partial day count therefore total escapement should be considered a minimum value.

Appendix K2.–Daily and cumulative (Cum.) migration of all salmonid species past the Unalakleet River weir, Norton Sound, 2014.

Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
6/28	365	365	8,562	8,562	5	5	0	0	1	1
6/29	315	680	9,465	18,027	2	7	0	0	0	1
6/30	113	793	1,481	19,508	2	9	1	1	2	3
7/01	537	1,330	10,427	29,935	8	17	1	2	6	9
7/02	1,996	3,326	13,685	43,620	15	32	1	3	8	17
7/03	2,127	5,453	16,975	60,595	72	104	0	3	4	21
7/04	5,989	11,442	50,169	110,764	86	190	0	3	31	52
7/05	4,420	15,862	62,102	172,866	117	307	0	3	22	74
7/06	5,687	21,549	270,008	442,874	254	561	3	6	42	116
7/07	4,082	25,631	345,932	788,806	149	710	17	23	26	142
7/08	711	26,342	54,362	843,168	34	744	4	27	4	146
7/09	2,686	29,028	93,425	936,593	119	863	5	32	13	159
7/10	1,588	30,616	51,423	988,016	58	921	4	36	9	168
7/11	1,321	31,937	35,106	1,023,122	52	973	3	39	2	170
7/12	1,714	33,651	36,171	1,059,293	74	1,047	10	49	5	175
7/13	1,719	35,370	42,541	1,101,834	55	1,102	6	55	2	177
7/14	1,675	37,045	29,996	1,131,830	8	1,110	30	85	0	177
7/15	665	37,710	7,998	1,139,828	12	1,122	7	92	0	177
7/16	197	37,907	3,495	1,143,323	0	1,122	5	97	1	178
7/17	175	38,082	5,451	1,148,774	0	1,122	11	108	3	181
7/18	185	38,267	8,277	1,157,051	0	1,122	42	150	3	184
7/19	244	38,511	4,520	1,161,571	0	1,122	43	193	0	184
7/20	82	38,593	2,084	1,163,655	0	1,122	16	209	0	184
7/21	151	38,744	4,065	1,167,720	0	1,122	32	241	1	185
7/22	129	38,873	3,709	1,171,429	0	1,122	48	289	1	186
7/23	128	39,002	3,258	1,174,687	0	1,122	87	376	1	187
7/24	118	39,119	2,039	1,176,726	0	1,122	111	487	0	187
7/25	91	39,210	1,327	1,178,053	0	1,122	129	615	0	187
7/26 [a]	0	39,210	94	1,178,147	0	1,122	1	616	0	187
7/27	24	39,234	565	1,178,712	0	1,122	77	693	0	187
7/28	65	39,299	1,355	1,180,067	0	1,122	97	790	0	187
7/29	170	39,469	2,748	1,182,815	0	1,122	246	1,036	0	187
7/30	120	39,589	960	1,183,775	0	1,122	185	1,221	0	187
7/31	82	39,671	251	1,184,026	0	1,122	150	1,371	0	187
8/01	142	39,813	318	1,184,344	0	1,122	121	1,492	0	187
8/02	1,429	41,242	2,946	1,187,290	0	1,122	987	2,479	0	187
8/03	2,279	43,521	1,069	1,188,359	0	1,122	1,558	4,037	2	189
8/04	1,382	44,903	1,266	1,189,625	1	1,123	782	4,819	1	190
8/05	1,316	46,219	899	1,190,524	1	1,124	1,898	6,717	1	191
8/06	1,699	47,918	1,402	1,191,926	0	1,124	3,144	9,861	0	191
8/07	1,008	48,926	758	1,192,684	0	1,124	1,698	11,559	0	191
8/08	553	49,479	338	1,193,022	0	1,124	1,389	12,948	2	193
8/09	505	49,984	225	1,193,247	0	1,124	1,582	14,530	1	194
8/10	635	50,619	236	1,193,483	0	1,124	1,566	16,096	1	195
8/11	564	51,183	191	1,193,674	0	1,124	2,206	18,302	3	198
8/12	969	52,152	183	1,193,857	0	1,124	2,757	21,059	2	200
8/13	442	52,594	130	1,193,987	0	1,124	2,041	23,100	0	200
8/14	292	52,886	120	1,194,107	1	1,125	1,809	24,909	0	200
8/15	358	53,244	103	1,194,210	0	1,125	2,122	27,031	0	200

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Date	Daily Chum	Cum. Chum	Daily Pink	Cum. Pink	Daily Chinook	Cum. Chinook	Daily Coho	Cum. Coho	Daily Sockeye	Cum. Sockeye
8/16	366	53,610	90	1,194,300	1	1,126	2,915	29,946	2	202
8/17	342	53,952	50	1,194,350	0	1,126	1,716	31,662	1	203
8/18	193	54,145	9	1,194,359	0	1,126	1,680	33,342	1	204
8/19	245	54,390	30	1,194,389	0	1,126	2,293	35,635	1	205
8/20	195	54,585	34	1,194,423	0	1,126	2,412	38,047	1	206
8/21	139	54,724	43	1,194,466	0	1,126	1,513	39,560	0	206
8/22	111	54,835	20	1,194,486	0	1,126	634	40,194	0	206
8/23	131	54,966	32	1,194,518	0	1,126	559	40,753	0	206
8/24	119	55,085	50	1,194,568	0	1,126	917	41,670	0	206
8/25	94	55,179	47	1,194,615	0	1,126	825	42,495	0	206
8/26	70	55,249	24	1,194,639	0	1,126	501	42,996	0	206
8/27	92	55,341	69	1,194,708	0	1,126	1,528	44,524	0	206
Total	55,341		1,194,708		1,126		44,524		206	

Note: Quartiles are not shown because the target operational period of the project was not fully monitored. Dates in italics indicate days when some portion of the day's count was interpolated.

[a] Partial day count therefore total escapement should be considered a minimum value.

Appendix K3.–Age and sex compositions by year for Unalakleet River chum salmon ASL samples, 2010–2014.

Year	Sampling Dates	Number of Samples	Percent by Sex		Percent by (Age Group)						
			Male	Female	(0.1)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)
2010	7/05-7/29	247	41.3	58.7	0.0	6.1	78.1	15.0	0.8	0.0	0.0
2011	6/27-8/07	221	47.8	52.2	0.0	1.3	54.3	44.3	0.0	0.0	0.0
2012	6/24-7/28	199	50.7	49.3	0.0	0.0	49.3	47.4	3.3	0.0	0.0
2013	6/21-7/31	204	46.0	54.0	0.0	0.0	60.0	38.6	1.4	0.0	0.0
2014	6/30-8/14	213	48.3	51.7	0.0	0.0	20.9	77.8	1.3	0.0	0.0

Appendix K4.–Age and sex compositions by year for Unalakleet River Chinook salmon ASL samples, 2010–2014.

Year	Sampling Dates	Number of Samples	Percent by Sex		Percent by (Age Group)						
			Male	Female	(1.1)	(1.2)	(1.3)	(1.4)	(2.3)	(1.5)	(2.4)
2010	7/14-7/23	23 [a]									
2011	6/24-7/25	179	73.5	26.5	0.0	56.4	28.4	15.2	0.0	0.0	0.0
2012	6/24-7/30	208	64.8	35.2	0.0	27.4	58.3	14.3	0.0	0.0	0.0
2013	6/26-/8/04	97	48.0	52.0							
2014	6/28-7/13	165	67.4	32.6	0.0	7.1	67.9	23.4	0.0	1.6	0.0

[a] Sample size insufficient for sex composition analysis.

Appendix K5.–Unalakleet River weir water temperature (Temp.) and stream stage (Depth) observations, Norton Sound, 2013–2014.

	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
6/20	14.0	14.3		
6/21	12.8	12.5		
6/22	12.0	10.4		
6/23	11.3	7.6		
6/24	11.5	5.6		
6/25	12.3	3.4		
6/26	13.0	2.1		
6/27	12.3	2.4		
6/28	12.3	2.7	ND	18.3
6/29	12.3	1.1	9.5	17.8
6/30	10.5	0.3	8.0	17.0
7/01	10.3	10.4	9.5	16.0
7/02	8.8	33.2	9.5	15.0
7/03	7.5	37.5	10.5	14.5
7/04	7.0	47.5	11.0	16.5
7/05	6.0	85.0	11.0	12.0
7/06	6.5	79.2	13.0	11.5
7/07	6.8	71.0	13.5	10.8
7/08	7.5	79.6	12.0	10.3
7/09	7.5	ND	12.0	10.5
7/10	7.5	97.5	11.0	12.0
7/11	8.8	78.0	11.0	11.8
7/12	9.0	61.9	11.0	12.0
7/13	10.5	50.0	12.0	15.0
7/14	10.8	41.1	10.0	26.5
7/15	10.7	36.9	9.0	30.5
7/16	9.5	43.0	10.0	27.0
7/17	8.5	44.2	9.0	27.0
7/18	9.0	39.6	8.5	32.0
7/19	8.8	44.2	8.0	37.0
7/20	8.5	57.6	6.5	43.0
7/21	8.6	62.2	7.0	40.0
7/22	9.8	54.9	8.0	41.0
7/23	10.0	48.2	7.0	41.0
7/24	9.5	43.0	7.0	38.0
7/25	9.8	38.1	7.0	35.0
7/26	11.0	34.7	7.0	32.0

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	2013		2014	
Date	Temp. (°C)	Depth (cm)	Temp. (°C)	Depth (cm)
7/27	11.8	30.5	7.5	28.5
7/28	11.8	28.0	7.0	26.5
7/29	11.8	25.9	7.0	27.0
7/30	11.3	22.9	9.0	24.0
7/31	12.3	20.1	8.0	22.5
8/01	13.0	18.0	ND	21.0
8/02	13.3	17.1	10.0	21.0
8/03	11.8	17.4	11.0	19.0
8/04	10.8	21.6	10.0	20.0
8/05	ND	ND	10.0	21.0
8/06	10.5	21.3	10.0	21.5
8/07	11.0	19.8	12.0	21.0
8/08	11.0	18.9	12.0	20.0
8/09	10.5	20.1	11.0	18.0
8/10	10.0	23.2	12.0	17.0
8/11	9.5	26.2	ND	17.0
8/12	10.0	27.7	13.0	17.0
8/13	10.0	27.7	12.0	15.0
8/14	10.0	27.4	12.0	13.5
8/15	9.8	29.0	12.0	13.3
8/16	10.0	29.3	11.0	14.5
8/17	10.0	27.3	10.5	14.0
8/18	9.5	25.3	10.5	14.0
8/19	9.8	24.4	11.5	16.0
8/20	9.5	26.2	9.5	15.5
8/21	9.4	25.0	10.0	15.0
8/22	9.1	24.7	9.0	14.5
8/23			9.0	13.5
8/24			9.0	12.8
8/25			9.0	12.5
8/26			8.5	12.0
8/27			9.5	12.0

Note: Recorded water temperatures are morning water temperatures, except where morning temperatures were not available. Recorded water depths are highest recorded daily water depth.